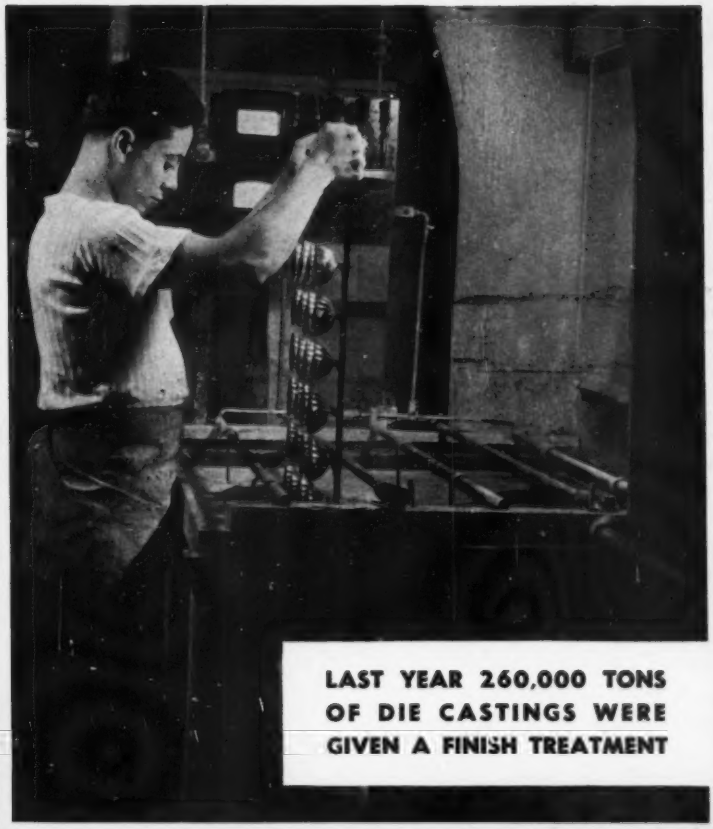
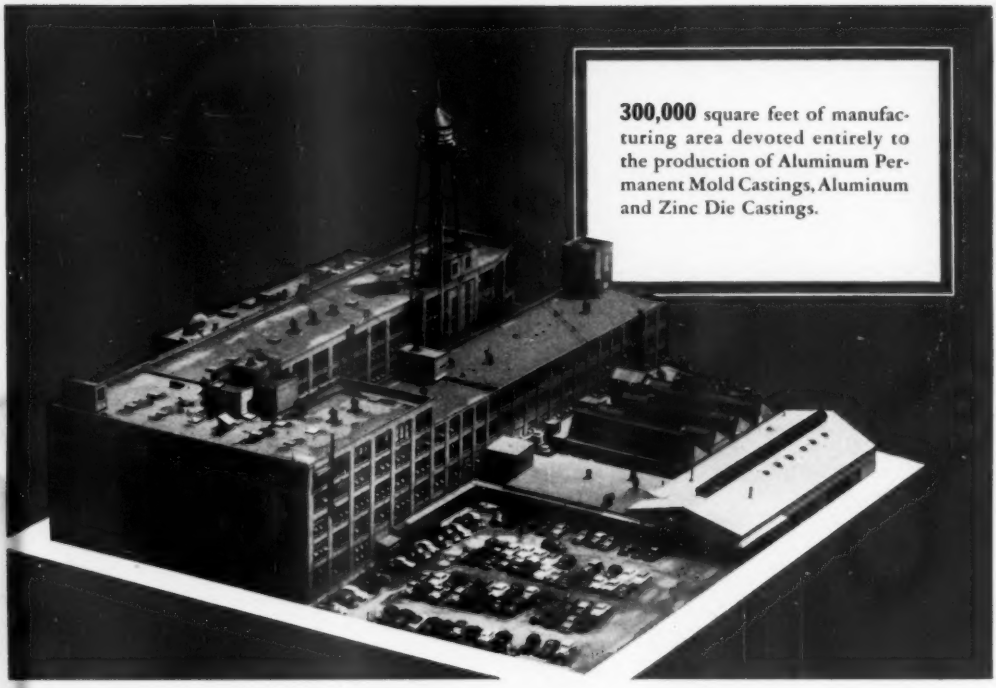
DIE CASTINGS

INCLUDING A SPECIAL FINISHING SECTION



LAST YEAR 260,000 TONS OF DIE CASTINGS WERE GIVEN A FINISH TREATMENT

THE PRODUCT DESIGN MAGAZINE FOR USERS AND POTENTIAL USERS OF DIE CASTINGS


300,000 square feet of manufacturing area devoted entirely to the production of Aluminum Permanent Mold Castings, Aluminum and Zinc Die Castings.

MONARCH IS MOBILIZED To Serve You Now!

Monarch has already been selected for prime and sub-contract defense requirements. We have capacity for additional production of aluminum permanent mold, aluminum and zinc die castings, plus facilities for complete assembly work regardless of casting requirements.

Monarch-Men work at every useful level in industry. They are in an excellent position to help you solve your own casting and related production problems.

Monarch, under one management for 37 years, has demonstrated the engineering, technical and production capabilities to meet any specific emergency.

Monarch welcomes the opportunity to work with you today in giving the widest possible casting or assembly services, utilizing the full scope of Monarch's unique facilities.

WRITE TODAY *for your copy of our new "FACT-FILE" folder which illustrates and describes Monarch's outstanding facilities. You'll want it for your castings source file.*

MONARCH ALUMINUM MFG. COMPANY • *Detroit Avenue at W. 93rd Street* • *Cleveland 2, Ohio*

APEX

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DIE CASTING ALLOYS

Dependable high quality die cast alloy ingot—an important factor in production for dependable die castings—made to exacting specifications—complete Spectrograph and Quantometer control from raw material to the finished alloy—assuring uniform composition—less production problems—more customer satisfaction.

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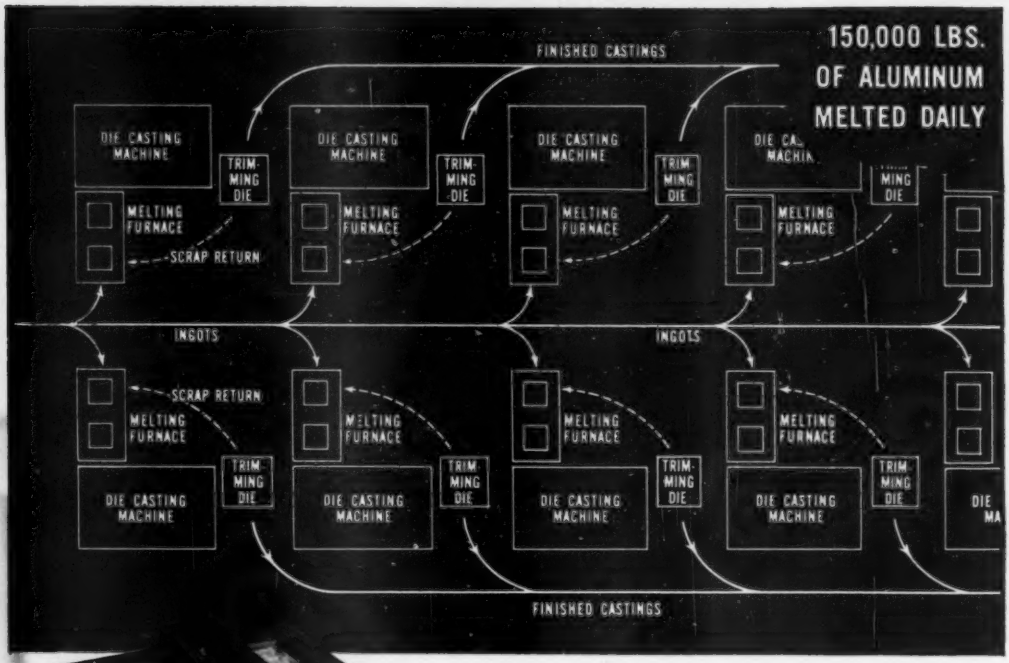

15 LINDBERG 2-CHAMBER FURNACES IN ONE DIE-CASTING PLANT....

One of the nation's newest die-casting plants uses 15 Lindberg Two-Chamber Furnaces in their die casting operations. These furnaces, operating on a 24 hour a day schedule have the capacity to melt 150,000 lbs. of alloy per day. Each furnace serves a separate die casting machine to produce these production advantages . . .

No melting room needed—all metal is melted at the casting machine, eliminating the need for carrying hot metal through the plant.

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Unified production unit—each die casting machine becomes a unified production unit—receiving cold alloy ingot, melting, holding, casting, inspecting, reclaiming scrap metal and reject castings—delivering only the finished casting to the production line. Obviously the savings realized are spectacular.

LINDBERG-Fisher MELTING FURNACES

Lindberg Engineering Co., 2450 W. Hubbard Street, Chicago 12, Illinois

"That's the Engineer who Specified Parker *Die Castings!*"

FIRST of all, this engineer saw the value of using the Die Casting technique for that difficult part. Even though the run was small, considerable savings were realized since no machining or finishing operations were necessary. He knew that Parker was the right choice to produce the casting, for Parker devoted almost their entire output to the aircraft industry during the last war. They became "aviation specialists," so to speak.

Parker is one of the oldest names in Die Castings. Our entire effort here is in the production of die cast parts for literally all types of industries.

Call in Parker engineers on your next quotations.

And when you think of Die Castings **- - THINK OF**

Parker White Metal Company • 2153 McKinley Ave. Erie, Penna.

PARKER ALUMINUM *and* ZINC *Die Castings*

MARCH 1951
Vol. 9 No. 3

DIE CASTINGS

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COVER—EACH YEAR thousands of tons of die cast parts are given a finishing coat or treatment for decorative or protective reasons. The product designer plays an important part in successful finishing, because the shape of the part has a critical effect upon the ease of finishing. Some of the aspects of design for finishability are discussed in this issue, together with a survey of the availability of finishes for die castings.

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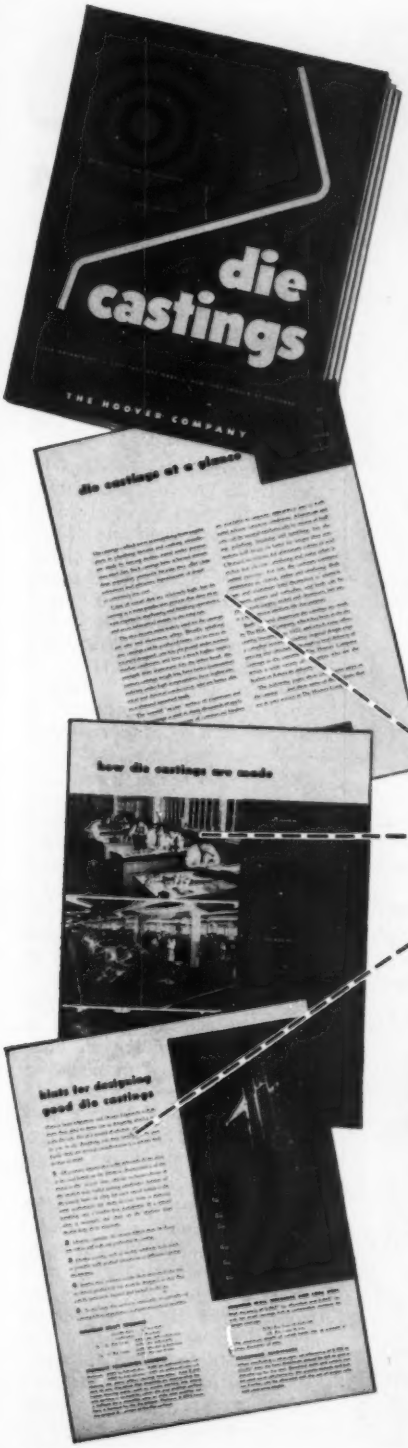
die castings
THE HOOVER COMPANY
die castings at a glance
how die castings are made
hints for designing good die castings

THE NEW "HOW-TO" BOOK ON DIE CASTINGS

GET YOUR FREE COPY OF THIS HELPFUL NEW BOOKLET NOW!

Manufacturers everywhere can profit from this authoritative new handbook on "How to step up production and cut costs with die castings."

It's big enough to cover a big subject, small enough to fit in a filing cabinet. It features basic information for management men on the cost-cutting advantages of die castings . . . contains practical suggestions and factual data for designers and product engineers.

It's offered as a free service by The Hoover Company, and it's based on Hoover's 29 years' experience in designing and making successful castings.

Tear off the coupon below and mail it today for your free copy!

TAKE A LOOK AT THESE SAMPLE PAGES:

DIE CASTINGS AT A GLANCE. A quick run-down on what die castings are, why they're so popular, and what kinds of castings to use for various purposes.

HOW DIE CASTINGS ARE MADE. Here's one of several picture pages showing the progress of a die casting job from start to finish, from idea to customer.

HINTS FOR DESIGNING. Suggestions, reminders, listings of specifications and tolerances . . . all sorts of information to help plan die castings that will look well, work well, and cut production costs.

Besides sending for your free copy of this helpful new book, you may need help on some special problem. Call in a Hoover sales engineer. There's no obligation.

HOOVER

Specialists in the field of die castings

THE HOOVER COMPANY, Die Casting Division, North Canton, Ohio.
Please send me a free copy of your new DIE CASTING BOOKLET.

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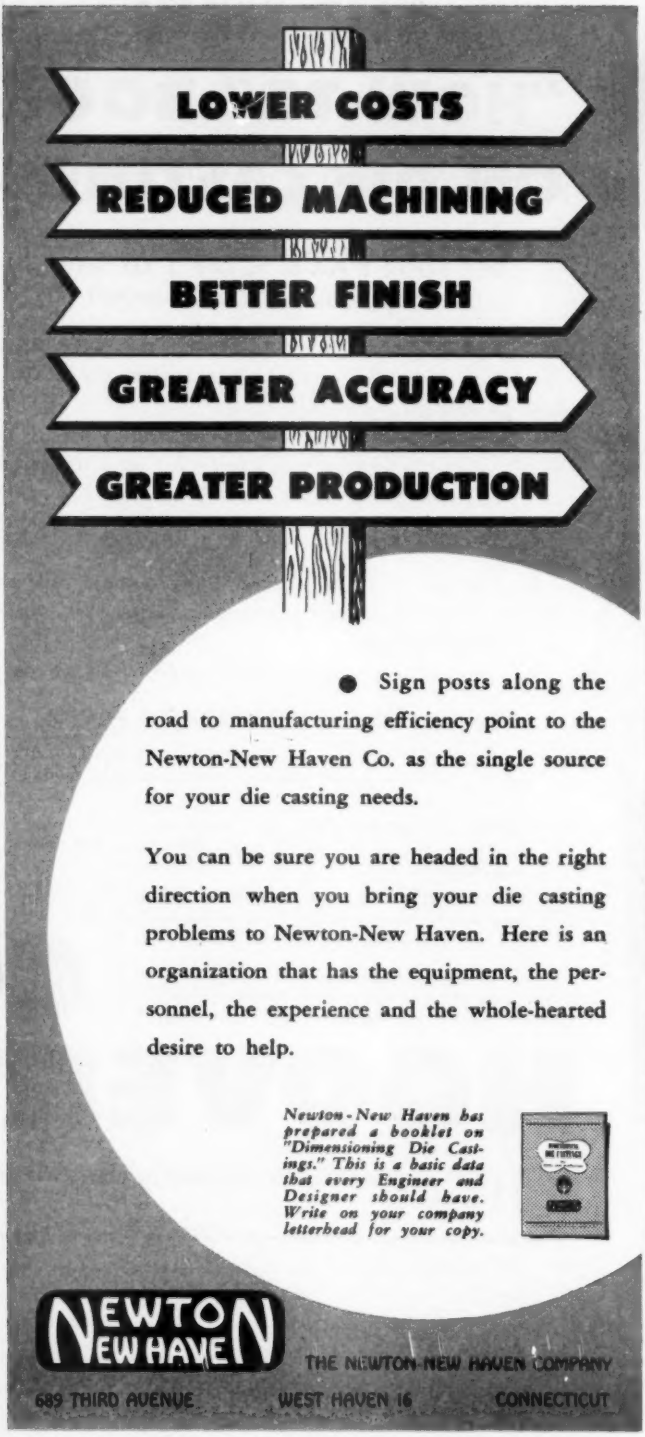
LOWER COSTS
REDUCED MACHINING
BETTER FINISH
GREATER ACCURACY
GREATER PRODUCTION
● Sign posts along the road to manufacturing efficiency point to the Newton-New Haven Co. as the single source for your die casting needs.
You can be sure you are headed in the right direction when you bring your die casting problems to Newton-New Haven. Here is an organization that has the equipment, the personnel, the experience and the whole-hearted desire to help.
Newton-New Haven has prepared a booklet on "Dimensioning Die Castings." This is a basic data that every Engineer and Designer should have. Write on your company letterhead for your copy.
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LETTERS to the Editor

24 WAYS TO AVOID TROUBLE

Please send me tear sheets of the article "24 Ways to Avoid Trouble in Die Casting Design" by H. K. Barton. Part One was in the Sept. '50 issue.—A.E.E.

Tear sheets forwarded.—Ed.

CLEANING DIE CASTINGS

The January issue of DIE CASTINGS has just reached us. In the same mail we received an urgent request from one of our salesmen for literature on cleaning surfaces. Glancing through the magazine we find an article in the Production Clinic beginning on page 39 dealing with "Clean Surfaces Important In Finishing Die Cast Parts." Would you be good enough to send one extra set of tear sheets? —H.P.

Whether die castings are to be painted or plated, the cleaning process is of critical importance and in many plants too little attention is paid to proper type of cleaning. For this reason, we have devoted several articles recently (and many during past several years) to the cleaning of die cast parts.

For example, in addition to the article mentioned above, a two-part study of the methods and materials used in cleaning aluminum die castings is being presented in the February and March issues. (See page 41.)

Where poor paint or plating adhesion occurs, improper cleaning is sometimes found to be the reason. Although adequate cleaning is a relatively simple matter and well-established procedures have been developed for accomplishing it, a number of varied cleaning cycles are available, depending upon the material to be cleaned and the subsequent surface treatment to be applied.—Ed.

TEN *Outstanding Advantages of the* AJAX-SCOMET *High Power* INDUCTION FURNACES *for melting metals*

1. 1000 KW or more per unit.
2. Uninterrupted around-the-clock production.
3. High efficiency and good operating conditions due to modern design.
4. Adaptable for copper, aluminum, zinc and their alloys.
5. Uniformity of alloy composition insured by large holding capacity.
6. Drastic reduction in labor cost per ton of metal processed.
7. Excellent scrap recovery with controlled metal circulation.
8. Large opening suitable for mechanized automatic charging.
9. Three-phase balanced stable load at line frequency.
10. Decreased lining cost with replaceable "twin coil" inductors.

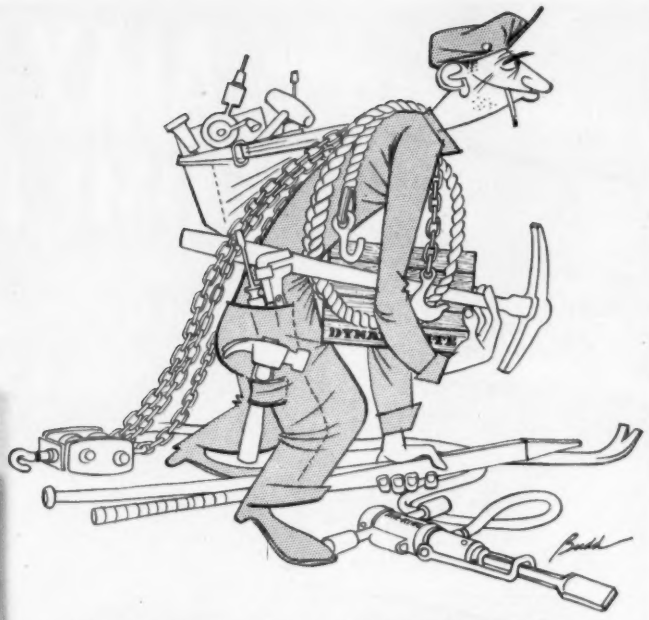
The photograph shows one of a battery of three Ajax-Scomet furnaces installed at the Scovill Manufacturing Company in Waterbury, Connecticut. Nominal rating 1000 KW operating up to 1200 KW.

This battery supplies all the metal required by one Junghans-Rossi continuous casting machine for producing 24" wide 1½" thick slabs for rolling. All commercial alloys are processed exclusively in these furnaces, which have been in continuous operation since early 1949.

Our ability to produce furnaces of the capacity shown here is ample evidence that we can fill most requirements, large or small.

AJAX ELECTRIC COMPANY, TRENTON 7, N. J.

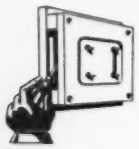
AJAX INDUCTION MELTING FURNACE



he's got everything but the ounce of prevention*

1. Dip blow pipe in Die Slick

2. Spray sparingly over die cavity face



3. Spray on ejector mechanism

"Poor Hubert could put away his pounds of cure to remove stuck castings, if he'd only prevent them in the first place, with Die Slick.*

Die Slick puts an end to sticking, scoring, soldering, and other costly headaches caused by faulty die lubrication. It will not stain castings, assures good surface finish, often stops plating problems before they start.

Unlike home-made part-time lubricants, each of the five grades of Die Slick is uniform—standardized *to do its job all the time.* It's inexpensive, saves many times its cost. No wonder nearly four out of five die casters use it regularly.

We suggest you try—and prove—Die Slick on your most difficult job, on a no risk basis. Simply specify the quantity you desire and the type of alloy on which you will use it. If you're not fully satisfied, simply return the unpaid invoice.

start every job with **DIE SLICK**

the industry's standard die lubricant

G. W. SMITH & SONS, INC., 5403 Kemp Road, Dayton 3, Ohio

LITERATURE AND SERVICES OFFERED IN THIS MONTH'S ADS

NOTE: Circle numbers on the enclosed postcard to indicate literature, samples or trial services you wish to receive.

No. 27. SAMPLES OF TINY DIE CASTINGS and bulletins covering production facilities are offered by the Gries Reproducer Corp. This company specializes in very small zinc die castings.

No. 28. A "HOW-TO" BOOKLET ON DIE CASTINGS is offered by the Hoover Co. The booklet shows uses for die castings, how they are made, and gives suggestions on die casting design.

No. 29. SAMPLES WILL BE PROCESSED FREE of charge by the Globe Stamping Div., Hupp Corp., to illustrate the quality of work turned out by their line of tumbling barrels. Further information sent on request.

No. 30. A FOLDER DESCRIBING THE MONARCH Aluminum Mfg. Co.'s plant and its zinc and aluminum die casting facilities is available from the company.

No. 31. "HOW TO DIMENSION PRINTS FOR DIE CASTINGS" is the title of a booklet offered by the Newton-New Haven Co. The booklet gives detailed instructions for guidance in dimensioning die casting drawings.

No. 32. PHYSICAL PROPERTIES AND COMPOSITIONS of USCO aluminum alloys are given on a slide-chart offered by the U. S. Reduction Co. By positioning the pointer under the alloy number, the user can read the information in windows provided.

No. 33. "DESIGNING FOR DIE CASTING" is the title of a booklet offered by the New Jersey Zinc Co. The booklet shows how castings can be improved and money saved by proper design.

(Continued on Page 12)

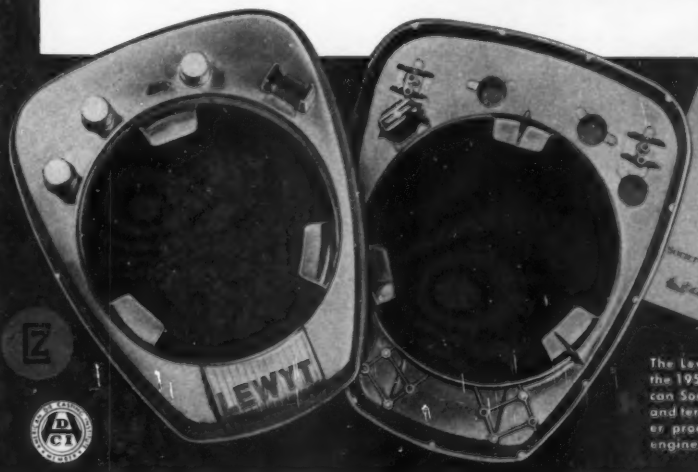
DIE CASTING
carries the load better
...and at less cost

CASE HISTORIES FROM MT. VERNON FILES

Each time a new product is slated for production, there arises the weighty question of what manufacturing procedure will prove most advantageous. That's when die casting merits careful consideration. For the outstanding efficiency and economy inherent in the die casting process means *quality at minimum cost.*

Here's a case in point: The new Lewyt Model 55 vacuum cleaner. Not only are its attachments die cast, but also the revolutionary new "caddie" which carries them. On the top of the caddie, are holders for four cleaning tools; on the bottom, holes for assembling the caddie to the dolly, and a clean-cut lip around the periphery to insure perfect contour fit. All these details are produced simultaneously, as the die closes — producing a light, strong unit which typifies the time-saving, step-saving and money-saving properties of die casting.

If you use metal parts in appreciable quantities, it's a safe bet die casting will "take a load off your mind" by helping you make a clean sweep of production problems. So why not follow the example of Lewyt, and consult with us? We feel confident we can show you the way to lower unit costs, improved products, increased output.



The Lewyt Model 55 was awarded the 1950 Merit Award of the American Society of Industrial Engineers, and termed "the best vacuum cleaner produced anywhere in beauty, engineering design and utility."

You'll often pay less

Automotive clutch housing
die cast in aluminum by Alcoa

for die castings of ALUMINUM than of any other metal!

A pound of aluminum can make three times as many die castings as a pound of heavy metal. This means that there is a point in the cost-weight ratio where aluminum die castings are less expensive. Let us quote on your die casting requirements—they may cost less in aluminum. If your casting is exceptionally large or complex, it's almost certain that it will cost less in aluminum than in any other metal.

So far we've talked only about the casting's cost as supplied to you. What will you pay to machine and handle it? Alcoa Aluminum Die Castings are easy to machine. Handling and shipping are less expensive.

Your local Alcoa die casting expert will gladly work out these cost factors with you. Include Alcoa in the bidding on your next job. Look under "aluminum" in your classified phone book. Or write ALUMINUM COMPANY OF AMERICA, 1895C Gulf Building, Pittsburgh 19, Penna.

ALCOA

MAKES ESSENTIAL DIE CASTINGS FOR MILITARY AND NON-MILITARY USES
ALUMINUM & MAGNESIUM

DEPENDABLE
BETTER METHODS
SUPER CAST
DIE CASTINGS
BETTER DIE CASTINGS
SINCE 1919

The meaning of a signature!

Through a quarter of a century of knowing how, the SUPER CAST reputation for Better Methods—Better Die Castings, has been recognized.

Sound engineering, metallurgical knowledge and skilled techniques have achieved and maintained a standard of superior quality.

SUPER CAST has kept faith, always deserving the mark it bears. SUPER CAST means die castings for those who want the best.

A sound, time-tested institution and a sound time-tested product have won confidence and widespread endorsement.

DEPENDABLE
BETTER METHODS
SUPER CAST
DIE CASTINGS
BETTER DIE CASTINGS
SINCE 1919

THE SUPERIOR DIE CASTING COMPANY

1001 London Road CLEVELAND 10, OHIO

Detroit Chicago Pittsburgh
Philadelphia New York

LITERATURE AND SERVICES

(Continued from Page 8)

No. 34 BURNISHING MIXTURES and suggestions on how to use them are contained in a catalog issued by the Abbott Ball Co. The company manufactures burnishing shapes made of bearing ball steel in many shapes and sizes.

No. 35. ENAMEL FILLING OF DIE CAST parts with the Acroprinter, manufactured by the Acromark Co., is explained in available literature.

No. 36. "ADVANCED BARREL FINISHING" is the title of a booklet offered by the Almco Division. The booklet gives details of the Supersheen method of controlled barrel deburring, grinding and finishing.

No. 37. ELECTRICALLY-CONTROLLED AIR MOTORS and other controlled-air devices built by the Bellows Co. are shown in Bulletins AV-300 and CL-30. Wiring diagrams, dimensions and other technical data are given in the bulletin.

No. 38. INFORMATION ON PLATING with Daniels OLS type barrels may be obtained from the Daniels Plating Barrel Co.

No. 39. THE ALUMON PROCESS, a dip treatment which prepares aluminum for plating with copper, nickel and other metals is explained in literature available from Enthone, Inc.

No. 40. SAMPLES AND LITERATURE on the Tap-Lok insert will be sent by Groov-Pin Corp. The Tap-Lok screw thread insert is made of hardened steel, and is inserted with a special tool.

No. 41. CASE HISTORIES and other information on backstand belt grinding and finishing with 3M equipment is offered in a booklet published by the Minnesota Mining & Mfg. Co. The booklet also tells about the 3M survey service for converting present equipment.

(Continued on Page 62)

"balance, 99.99+% zinc" *

DESIGNATION & COMPOSITION OF ZINC DIE CASTING ALLOYS:

	REFERENCE DESIGNATION	ALLOY 2	ALLOY 3	ALLOY 5
	NOMINAL COMPOSITION	Copper 2.5-3.5% Alum. 3.5-4.5% Mag. .02-.10%	Alum. 3.5-4.3% Mag. .03-.08%	Copper .75-1.25% Alum. 3.5-4.3% Mag. .03-.08%
ASTM	*American Soc. for Testing Materials*	*B86–XXI*	*B86–XXIII*	*B86–XXV*
SAE	*Society of Automotive Engineers*	*921*	*903*	*925*
NAVY	*U.S. Navy*		*46Z2b– Class A*	*46Z2b&c– Class B*
ARMY	*U.S. Army*		*57-93-2A Alloy A*	*57-93-2A Alloy B*
FED	*Federal Specifications*		*QQZ–363A*	*QQZ–363B*

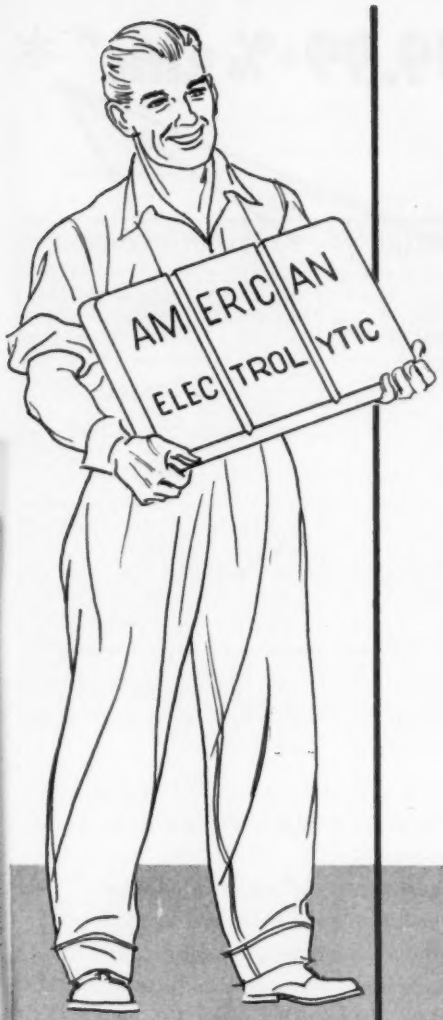
The phenomenal growth of the die casting industry—the second largest consumer of zinc today—was chiefly provided by the development of "four-nines" metal—which is standard for all zinc alloy die castings.

Prior to 1928, the year Bunker Hill pioneered the production of "four-nines" metal, zinc die castings based on lower grade metal were restricted in their applications due to limitations in physical properties. But as soon as industry was enabled to write "balance 99.99+% zinc" into their specifications, the quality and stability required in die castings were available and the use of zinc alloy castings increased enormously. Die Casting—the shortest distance between raw material and finished product—proved the answer to industry's need for accurate, high-speed and low-cost production of the most complex parts, in a single operation, just as zinc has proved itself as the ideal base metal for die castings. Currently over 70% of all die castings by weight are made of zinc.

DIE CASTING is the Process · ZINC, the Metal · BUNKER HILL, THE PREFERRED ZINC

BUNKER HILL 99.99+% ZINC

EASTERN SALES AGENTS ST. JOSEPH LEAD COMPANY 250 PARK AVENUE, NEW YORK 17
SALES OFFICE FOR PACIFIC COAST NORTHWEST LEAD COMPANY SEATTLE, WASHINGTON



AMERICAN ELECTROLYTIC

99.99+%

SLAB ZINC

FOR QUALITY PRODUCTION

A RELIABLE SOURCE

FOR DIE CASTING

REQUIREMENTS

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for AMERICAN ZINC, LEAD & SMELTING CO.
Columbus, Ohio
Chicago
St. Louis
New York

WE DID IT BEFORE...
WE ARE DOING IT AGAIN!

PRESSURE'S tool and die department capably met the time-tables of World War II.

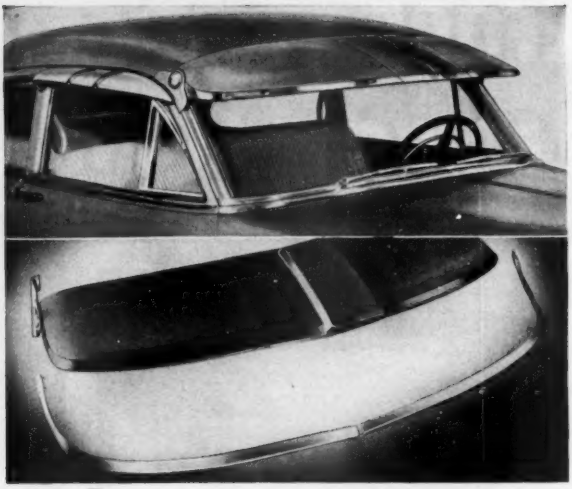
Today's Defense requirements are being handled with even greater dispatch as a result of our greatly increased tooling facilities.

Send us your inquiries.

PRESSURE CASTINGS, INC.

die castings

CLEVELAND 10, OHIO

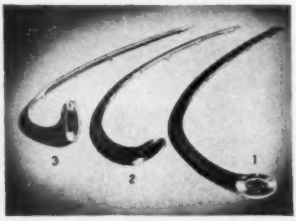


How to get the mo$t for your Zinc Die Ca$t $ Dolla$

$ MAKE USE OF THE DUCTILITY

Take advantage of the ductility of ZINC Alloys by designing parts for bending or forming after casting. This property makes it possible to shape flanges, to bend hollow arms, to spin out undercuts, to upset projections or to twist parts of the casting through 90° or more. *Whether the ZINC Die Casting be for civilian or military use,* the possibilities of cutting cost by forming difficult contours after casting should be fully explored.

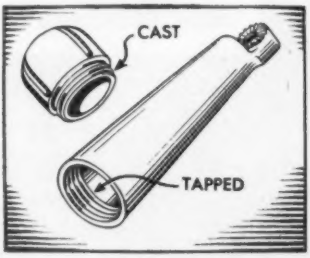
The two ZINC Die Cast leading edges for the above automobile sun visor are good cases in point. Since it was not economical to cast the outer ends of these parts with proper curvatures to fit the car bodies, the ends are cast flat (see #1 at the right). In two subsequent operations, performed at room temperature, the castings are shaped to the required angles—at low cost.



$ CAST EXTERNAL THREADS

Specify cast threads for ZINC Die Castings wherever their use reduces cost over that for cut threads. *External* threads can usually be cast with economy, but *internal* threads should be tapped for lowest cost. The two mating castings illustrated here require threads for assembly to form a drill handle. The external threads on the smaller of the two castings are readily formed at the die parting and are, therefore, economical to cast. The internal threads on the larger casting are tapped, however, since casting them would entail unscrewing of a core in the casting operation.

Send for your copy



For additional cost-saving suggestions ask us—or your die caster—for a copy of "Designing For Die Casting."

The New Jersey Zinc Company
160 Front St., New York 38, N. Y.

ZINC
FOR DIE CASTING ALLOYS

The Research was done, the Alloys were developed, and most Die Castings are based on
HORSE HEAD SPECIAL (99.99 + % Uniform Quality) ZINC

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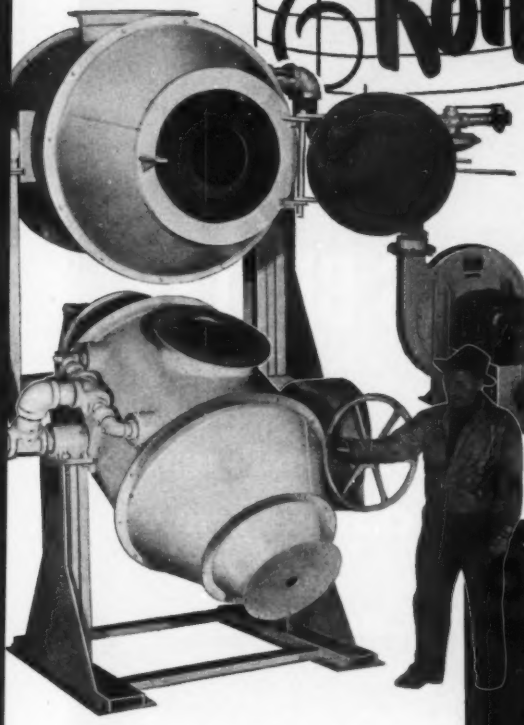
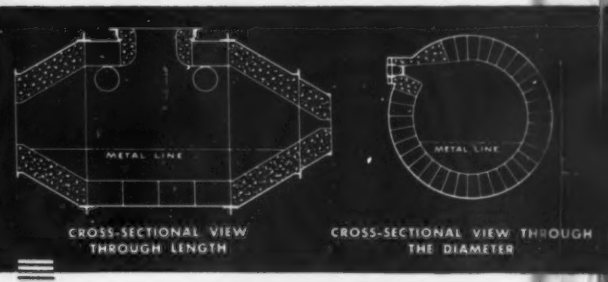


Top—Shows end charging and skimming door.

Bottom—Tilted in pouring position, showing top charging hopper.



CROSS-SECTIONAL VIEW THROUGH LENGTH

CROSS-SECTIONAL VIEW THROUGH THE DIAMETER

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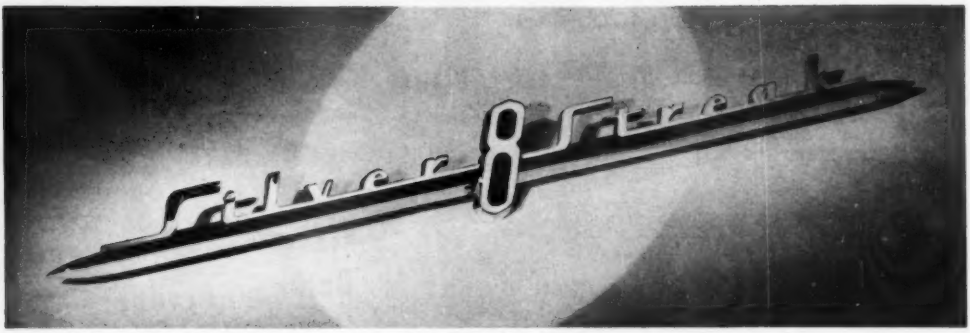


DIRECT PLATING OF CHROMIUM OVER ZINC or cadmium plate may be the answer to the problem faced by users of plated die castings now that copper and nickel may not be utilized for decorative plating. Patent application has been filed covering methods of electrodeposition of bright chrome over zinc or cadmium plate*.

Availability of Finishes for Die Castings

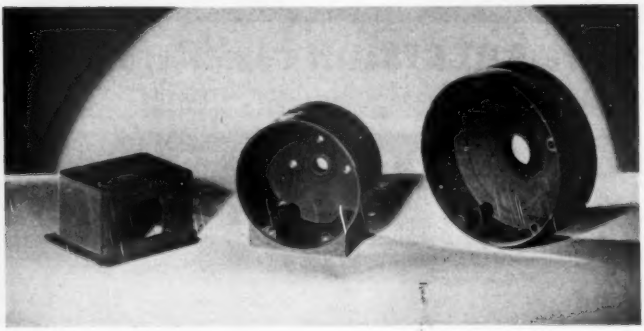
THE ABILITY to provide suitable surface coatings and treatments will have an important influence on the specification of die castings, both for defense and non-defense production during the coming period.

For non-defense industries, the problem will be to obtain satisfactory substitutes for finishes normally used, but now curtailed or eliminated by the materials shortages.

For defense procurement, the question of using die castings, in some instances, revolves around the ability to surface-treat the die cast parts so that they meet government specifications.

At any rate, the designer of metal parts must be increasingly aware of the final surface treatment to be applied. He will need to know how the conditions of service will affect the part and what finishes are available to protect or decorate it.

ANODIZING with a sulphuric acid bath has been the method used to protect these die cast aluminum aircraft components from corrosion.



Decorative Chrome Plate

NPA regulations prohibiting the use of copper and nickel for decorative plating hits particularly hard at some large volume users of zinc die castings.

To produce a satisfactory bright chrome plate on zinc die castings, preliminary coatings of copper and nickel are applied. As a result of extensive development work, standard specifications have been set up and a bright, durable and adherent plate achieved.

However, with the curtailment of copper and nickel for decorative plating, users of chrome plated die castings have had to look around for substitute processes and materials. Large volume users of such plated die castings include the automotive, household appliance and vending machine industries.

GET DETAILED INFORMATION ON FINISHING PROCESSES FOR DIE CASTINGS

For further information concerning the materials, equipment and methods used for finishing die cast parts by methods referred to in this article, circle the appropriate number on the Reader Service Card bound into this magazine.

Bright chrome plate directly over zinc (1)
Bright dip over zinc plate (2)
Brighteners for zinc and cadmium (3)
Clear baking lacquer (4)
Black protective finishes (5)
Chromate protective coatings (6)
Phosphate protective coatings (7)
Anodic coatings (8)
Organic coatings (9)
Protection for magnesium die castings (10)

BRIGHT CHROME DIRECTLY OVER ZINC PLATE.

Patent applications have recently been filed covering the electrodeposition of a bright, decorative chrome plate directly over a zinc or cadmium plated base.*

This plating method, it is reported, is applicable to such metal parts as zinc, aluminum or magnesium die castings as well as steel parts. Introduction of this process for the decorative plating of automotive hardware and trim is now being intensively explored by major motor car manufacturers.

By side-stepping the use of copper and nickel, this process promises a reprieve for decorative chrome plating on cars, appliances and other products.

BRIGHT DIP OVER ZINC PLATE.

A chrome-type appearance is produced by the application of a proprietary dip over bright zinc plate. While this type of finish lacks the weather-resistance of the copper-nickel-chrome coating, it is suitable for applications where conditions of exposure are not severe but where the bluish brightness of chrome is desirable.

By means of a clear baking lacquer applied over the dip coating, the durability of the finish can be greatly enhanced.

BRIGHTENERS FOR ZINC AND CADMIUM PLATING.

The addition of brighteners to improve the brilliance of the metal coating is also common practice. Several proprietary brighteners are available.

Military Finish Specs

Finishes for military components are set forth as part of the original specifications drawn up by the government agency concerned. The development of many protective coatings capable of withstanding the conditions of exposure has made it possible to use zinc, aluminum and magnesium die castings for service where salt air, heat, jungle conditions and dampness prevail.

BLACK FINISHES.

Protective coatings composed of nickel salts or oxides were specified for many uses on military components during World War II. Several types of these black finishes are suitable for treating zinc die castings both by electrolytic and non-electrolytic methods.

Non-electrolytic black coatings, applied by simple immersion methods, include both inorganic oxide coatings and complex nickel ammonium sulfide. The non-reflective black coloring is sometimes a desirable feature, along with the corrosion inhibiting characteristics of the coating. It also serves as a good preliminary treatment to improve the adherence of paint or other organic coatings.

CHROMATE AND PHOSPHATE TREATMENTS.

A number of chemical conversion coatings developed to inhibit corrosion of zinc die castings are available to meet government specs. Some of these are suitable for both zinc and aluminum die castings.

Conditions of excessively high humidity or salt atmosphere have a tendency to develop white corrosion salts on die cast parts. To counteract and prevent this corrosion, several proprietary chemical treatments are available, the majority of them applied by hot immersion or spraying, and requiring simple equipment. In general, these coatings form an inert crystalline or

(Continued on Page 60)

* For additional information concerning processes mentioned in this article, circle the appropriate numbers on the Reader Service Card.

FINISH SPECIFICATION IS PART OF THE DESIGN JOB

SPECIFYING surface finish on die castings as an afterthought is a common fault that sometimes causes unnecessary production-line headaches, increases the percentage of rejects, wastes valuable time and often results in unsatisfactory appearance or defective coatings.

Millions of die cast parts receive the highest quality surface treatments each year. A wide variety of finishes and well standardized procedures for applying them make this possible. The product designer who becomes familiar with these finishes will be much more successful than the one who leaves all consideration of finishing problems to the production and sales departments.

When the designer is drawing up the components of which his product will be constructed, he should have clearly in mind the type of finish to be applied. He should know what type of organic coating, plating, chemical treatment or mechanical finish is to be applied and how it will affect the design of the parts.

The close relationship between the design of parts and the specifications for finishing is illustrated in the articles featured in this issue.

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DIE CASTINGS CAN BE DETAILED FOR EASIER FINISHING

By HIRAM K. BARTON

DIE CASTINGS offer an unparallelled scope to the stylist in the variety of surface finishes that can be satisfactorily applied to them; organic, chemical dip and electrolytic coatings, decalcomanias and sprayed flock, lithographed timber grainings and clear lacquers—in fact, virtually any finishes but high temperature japanning and vitreous enameling have been proved practicable.

With such a range available, it is perhaps not to be wondered at that the final decision upon an appropriate surface finish is often left until sample die castings have been made available for experiment and evaluation. It is highly questionable, nevertheless, whether this is a sound approach, either esthetically or technically.

From the point of view of the stylist, it is certain that arbitrary alterations of texture, color and tone values cannot be made without impairing the total effect. Form, from the stylist's angle, is not just eyeable shape, but rather an aggregate of all the sensory stimuli of the product, whether visual or tactile. Not one of the factors involved in the build-up of this complex consortium can be modified without detracting in some way from the effect of the others.

It is true to say, therefore, that in a well-designed product the surface finish will not be an afterthought, but will be considered right from the outset as a major and integral factor in consumer acceptance. But this carries with it an important corollary. Just as the adoption of a specified finish determines the visual impact of the finished product, so too the method of applying that finish is highly relevant to the design of the die castings from which the product is assembled.

Features of the design that may cause processing difficulties with one finish, either in the actual application or in pretreatment, are often quite innocuous when a different finish is adopted. Further, the effect of the applied finish upon the ease of processing runs right through the whole production set-up, affecting die costs, trimming costs, inter-process handling and packaging costs.

To take an extreme instance, it is easy to see that of two die castings identical in form, one given a single-coat wrinkle finish and the other plated with a Butler finish in silver, the former requires much the less care in handling at every stage, need not have so good an as-cast finish, shows to a far less extent any imperfections of trimming or the effects of slight mishandling during processing, is better adapted to casual methods of bulk packing and, in short, is a cheaper job in every sense.

What is not so easy to see is that design features that cause no trouble with the cheaper finish may add appreciably—and unnecessarily—to the inherently higher costs of a quality finish. Strangely, the converse

THE PRODUCT DESIGNER CAN SIMPLIFY THE JOB OF FINISHING BY CAREFUL ATTENTION TO DETAILS

There are many small tricks which the product designer can apply to help in the removal of buffing compounds, prolong the life of buffs, cut down on the plating difficulties, and improve flash removal. It is also possible for the part to be designed in such a way that less expensive methods can be substituted. Presented here are a few such economical methods.

also holds, and features that present no obstacles to the more exacting processing demanded by a high-grade finish may make it difficult to adopt cheaper finishing methods satisfactorily. This applies particularly to low-cost bulk treatments such as tumbling.

It probably never will be possible—and, emphatically, is not possible here and now—to lay down definite design rules of universal application, either in the field of die casting or for any other manufacturing method. Too often the requirements of production, of processing and of assembly pull different ways, so that in any particular application individual weight must be given to whichever of these three—and a host of other production aspects—appears to be most important.

Because of this, it would be valueless to talk general principles, and this article seeks only to point out the effect upon finishing methods of some of the more salient features that recur again and again in die cast products. In some cases it may well be that the advantages of a certain course outweigh its disadvantages; the disadvantages should nevertheless be remembered when evaluating the design.

Components designed to be finished by electro-deposition must above all be smoothly contoured, free from sudden small breaks in profile either raised or recessed, and as far as possible should be without sharp angular edges anywhere. These considerations are primarily dictated not by plating factors, but by the demands of quick, clean and—if practicable—automatic buffing.

•

SMOOTH, FLOWING SURFACES, even though the curves may be complex, are easy to buff: any sudden break in the surface, however, whether step, ridge, rib or channel, calls for individual attention and so slows down the operation. One feature to be avoided more than any other on platable surfaces is the integral rivet; useful though this device proves in many applications, it is always a heartbreak to the polisher.

Thus in the casting of Figure 1 (left) four small integral rivets are provided for the attachment of an engraved sheetmetal name-plate, and make it impossible to buff the surrounding area effectively. The small pro-

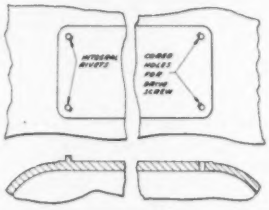

Figure 1

jections fret the buff, provide lodgement for the buffing compound and so necessitate special cleaning, and frequently become distorted by the generated heat.

In the particular casting from which the sketch was taken it was decisively shown, by eliminating the integral rivets, that they had raised processing costs by more than eight times the cost of securing the name-plate by drive-screws. In the modified design (right) the rivets were replaced by cored holes; note that these are carried right through the section. This is because some buffing compound is still smeared into the holes, and if they were blind it would be necessary either to clean them out or risk the drive-screws not running right home, as depicted on the right hand side of the lower sketch.

•

WHILE DEALING WITH NAME-PLATES, another feature frequently encountered in connection with them may be here considered. This is the provision of a framing bead or rib around them as in Figure 2.

If such a frame is considered essential to a neat finish the bead should be a shallow one, and on the inside should run into a groove, deeper than the face upon which the plate is located, as on the right of the fig-

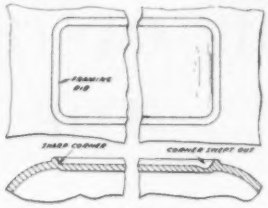

Figure 2

ure. This gives tolerably good finishing conditions, whereas the usual right-angled seating for the edge of the stamping does not.

Despite this it is usually preferable to locate the plate between two ribs only, these being faired off at each end into the general contour of the casting, Figure 2a. The casting can then be polished *in the direction of the ribs* without difficulty, either automatically or by hand.

This applies also to channels or grooves set below the general level of the surface; in both cases the essential requirement is that these features shall be

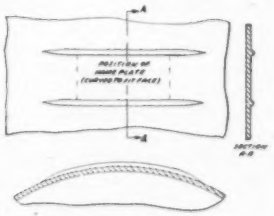

Figure 2a

located so that the buff follows their course instead of meeting them transversely.

The primary reason for using engraved nameplates is often the obvious difficulty of polishing and finishing a surface that is broken at one point by a mass of fine detail; a satisfactory alternative in many instances is the use of a separate die cast plate let into the body of the

component. This permits deeper characters and sharper definition than a stamping can give.

•

PLAQUES PRODUCED AS DIE CASTINGS are best finished by sandblasting and enameling in contrasting colors, rather than by plating. They may be assembled either by the use of integral rivets, Figure 3, —the rivets being on the plate

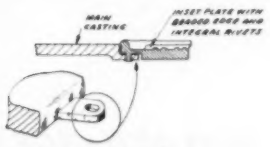

Figure 3

and not on the main casting—or more simply by flat lugs under the edge of the casting as in Figure 4.

The name-plate need not be of the same alloy as the component; a zinc alloy name-plate may quite well be used with an aluminum die casting — most such parts are in fact produced in zinc because of the extreme sharpness of impression obtained, and the ductility of alloys in this group also facilitates assembly by the methods indicated.

•

WHEN COMPONENTS ARE TO BE BUFFED it is advantageous if all cored holes are provided with a small radius where they meet the polished surface. If this is not done there is a tendency for the edge of the hole to be smeared on one side and abraded on the other. While the latter point may not be of importance, the smeared edge is likely to impede the assembly of mating parts.

Even when the size and dimensions of the opening are not critical it is as well to radius the edge, and for this reason holes should be cored from the polished face and not vice versa. The two ways are shown in Figure 5.

With the hole cored from the back of the die casting, flash removal leaves a sharp edge which

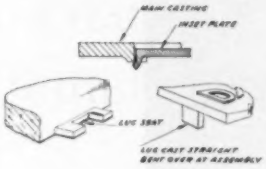

Figure 4

must be buffed off. This can never be so smooth and regular as a true radius formed in the die, and naturally demands exceptional attention if it is to be in any way satisfactory. If the hole is cored from the front of the casting the radius is formed right where it is needed, and the flash is formed at the bottom of the hole. From this location it can readily be trimmed without leaving obtrusive traces.

As it is often easier for a die sinker to leave the cavity surface unbroken and form the holes by projections on the main core giving a casting like that of the top sketch, it is desirable to annotate the part drawing "Flash to be brought off along this face" as shown below in Figure 5.

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TUMBLING IN BARRELS offers an attractively low-cost pre-finishing treatment for small die castings. By tumbling with appropriate media castings

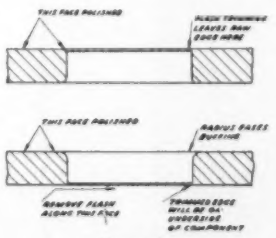

THIS FACE POLISHED
FLASH TRIMMED LEAVES RAW EDGE HERE
THIS FACE POLISHED
RADIUS FORMED DURING
REMOVE FLASH ALONG THIS FACE
TRIMMED EDGE WILL BE IN OPPOSITE DIRECTION

Figure 5

may be de-flashed, burnished or even brought to a sufficiently high luster to obviate, in some applications, the need for buffing. Tumbling technique is admittedly empiric, and before satisfactory results are obtained it is often necessary to process many, many barrel-charges under varying conditions of rotation speed, duration and with different abrasive chips.

A common error is to load too many castings and too few chips. Quite apart from the actual technique of tumbling, however, there are a number of points in the design of castings which radically affect the results obtained. Successful deflashing, for example, is only attained when the flash around the casting is relatively thin and even.

Moreover, in contrast to die-trimming, flash is cleared much more readily from an edge than from partway up a face. Flash at the edge of a casting tends to leave a rag or fray when die-

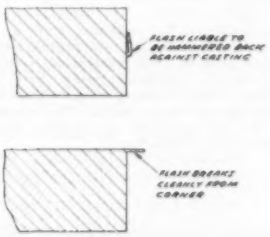


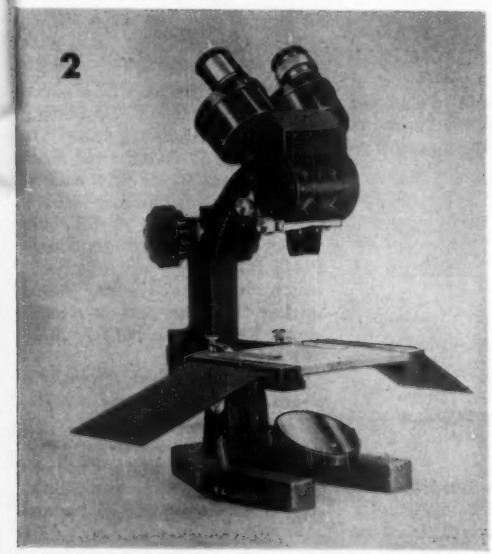
Figure 6

trimmed, whereas if sheared against the body of the casting it comes away cleanly. In tumbling it is found that flash coming away from the wall is at least in part hammered back as in Figure 6, top sketch, and cannot then be easily dislodged. Flash formed in vent channels, which is usually some 0.004 thicker than the rest, is particularly liable to be bent back in this manner.

Additionally, flash formed in re-entrant parts of the profile or in corners, and at steps in the parting-line, is not readily removed by tumbling. This applies also to unbroken flash, even if very thin, that is formed

(Continued on Page 64)

THE NEW MODEL of the stereoscopic microscope is illustrated in Figure 1, above, and the old model which it replaced is shown in Figure 2, below. The company achieved savings as high as 75 percent on the machining costs by utilizing the as-cast accuracy inherent in the die casting process. Moreover, the new design is much more streamlined, with better appearance design and finish. Additional savings have accrued to the company through easier assembly, simplification of finishing problems and interchangeability of parts. The company describes the change to die cast parts as an essential step in modernizing the 15 microscopes in this line.



INTERCHANGEABLE MODERNIZE LINE

THE Bausch & Lomb Optical Company, Rochester, N. Y., has replaced a number of sand cast and stamped parts with aluminum and zinc die castings in its complete line of stereoscopic wide field microscopes.

Die castings have, during recent years, been introduced as structural and functional elements in many types of precision instruments* where strength, rigidity and dimensional stability are equally as important as lowered production costs.

It is therefore in keeping with sound engineering practice and field experience that Bausch & Lomb engineers gave consideration to die cast parts in redesigning these high precision professional instruments. The change to die castings was, in fact, an essential step in a modernization program planned to improve the design of the 15 microscopes making up the complete stereoscopic line.

The model discussed here is representative of the line of microscopes. To provide a com-

* Design of other types of precision instruments previously discussed in DIE CASTINGS includes: analytical balance (Nov., 1950, pg. 36), timing devices (May, 1950, pg. 35), surveyors' transits (Jan., 1950, pg. 32) and many others.

CHEMICALLY-INERT SYNTHETIC ENAMEL REQUIRED FOR MICROSCOPES

By CHARLES HENDERSHOTT
Foreman of Metal Finishing
Bausch & Lomb Optical Co.

DIE CAST PARTS OF MICROSCOPES

parison, the new model is illustrated in Figure 1, and its predecessor in Figure 2.

Up to 75 per cent of the machining cost has been saved on certain components as a result of the conversion project. The earlier high cost of secondary operations resulted from the necessity of grinding and polishing rough iron and brass sand castings before applying an organic coating. The presence of blow holes entailed a great deal of time for filling and sanding operations.

Finishability was certainly a a major factor in specifying die cast parts. The knowledge that a tough, adherent semi-gloss baking-enamel could be obtained on die cast zinc or aluminum and would resist the effects of exposure to chemicals and fumes, was an important consideration.

In addition, the actual fabrication of parts has been simplified. In some instances it was possible to combine two parts into one through die cast design which reduced parts inventories and eliminated assembly operations. Aside from these economies in inventories and assembling, the combination of

(Continued on Page 62)

The use of die cast parts in the new line of Bausch & Lomb stereoscopic wide field microscopes depends, in part, upon the ability to obtain a finish which: 1) adheres to the die cast surfaces, 2) has the required color and surface quality, 3) provides the necessary properties of toughness and hardness, and 4) resists the attack of chemical reagents and fumes.

The finishing of these microscopes is critical because it serves both a decorative and functional purpose. In medical, industrial and educational laboratories where these microscopes are used, the exposure to acid and alkaline fumes and chemical spillage calls for a smooth hard surface that is inert chemically and easy to keep clean.

The synthetic enamel used on these microscopes is thus an aid to cleanliness. By using a semi-gloss rather than a high gloss, distracting highlights are avoided. The soft grey color harmonizes well with any surroundings or background.

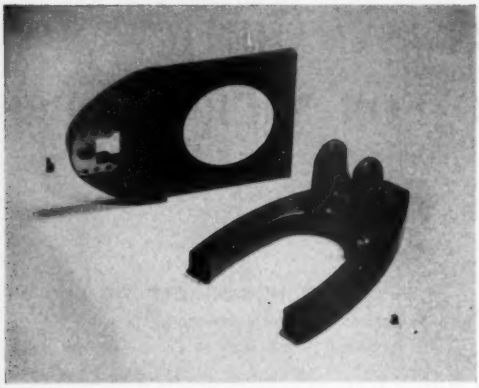
In general, two types of finishing cycles are used for die cast parts:

1. All zinc base die castings are degreased and phosphate-coated as a preparation for application of the synthetic baking enamel.
2. Aluminum die castings, except those with bronze inserts, are anodized using a sulphuric acid type bath and are dyed black. This provides a non-reflective optical black for interior surfaces as well as an excellent paint base for exterior surfaces. Since copper alloys cannot be anodized, aluminum die castings having bronze inserts are phosphate treated prior to painting.

Smoothness of the metal surfaces is essential because the paint coating does not hide surface flaws, as wrinkle or hammer-type paints do. Grinding and polishing must be carried out very

(Continued on Page 34)

Here Are Some Reasons Why Bausch & Lomb Are Using Die Castings

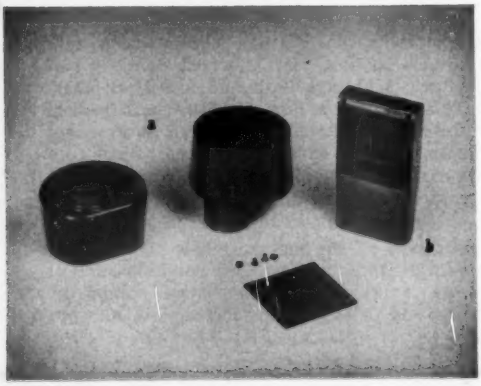


3. FOR REASONS OF STABILITY, the base (a) is one of two parts that is cast of a zinc alloy. A boss on its underside is cast with a hole; the latter is tapped for attachment of the instrument to the cabinet in which it is shipped (to prevent damage in transit). Two cored holes in the upright (with counterbores) serve for the attachment of the inclination joint and axle.

The stage, (b) the second of the two zinc alloy parts, has a number of cored holes for attachment purposes. Note, incidentally, that this characteristic of die cast design eliminates a considerable amount of machining that would otherwise be necessary. The larger holes are used for attachment to the inclination joint, while the smaller ones serve for fastening the slide block (a machined red brass part which is the vertical adjustment for focusing). With the two major lower parts of zinc and the upper parts cast of aluminum, the proper weight relation between the bottom and top of the instrument is maintained. The heavier zinc components give the microscope a "firm footing," while the lighter aluminum parts, used for adjustment only, prevent top-heaviness.

4. A FEATURE of the light-weight aluminum arm (a) is that it has two closely spaced bronze inserts (⅛ inch apart) which act as bearings for the prism housings. (The latter serve for adjustment of interpupilary distance. A boss on the underside of the arm is drilled to accommodate a lamp bracket. Another important feature of the die cast arm is that a nose piece adapter was combined with it; in the past these had been two separate sand castings.

Aluminum die casting this small pinion cover (b) facilitated the introduction of a mechanical improvement in the design, a part of the modernization program. This was the addition of a spring-loaded pinion bearing, which provides external adjustment for focusing the adjustment slide. By designing the pinion cover as a die casting, Bausch & Lomb instrument engineers developed a piece with a cavity which in turn permitted mounting the spring mechanism without going into an elaborate tooling program. Two bosses on the underside of this piece are drilled and tapped, and serve for attachment purposes, together with two cored holes on the other side of the piece.



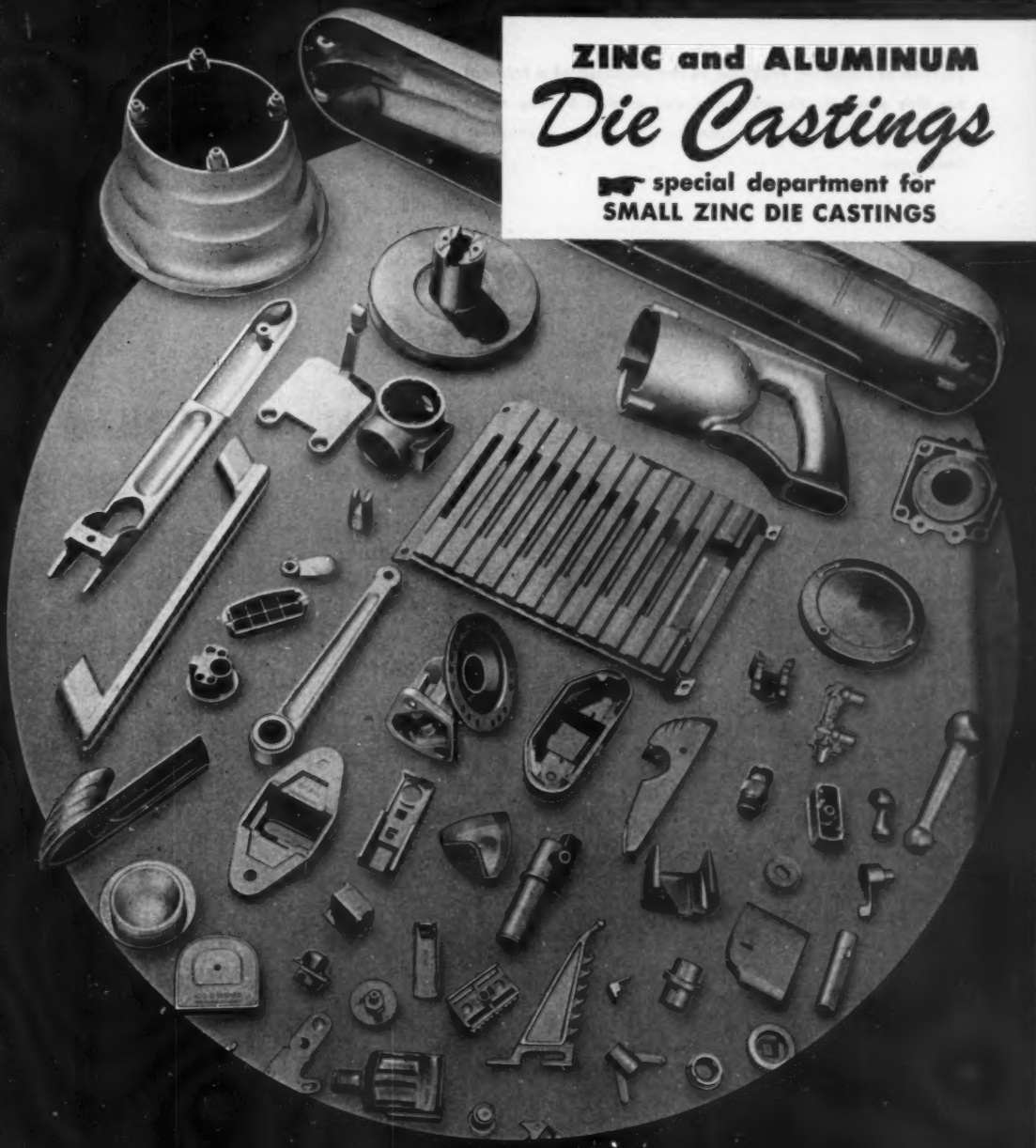
5. AN OUTSTANDING FEATURE of the prism covers (a) is that the eyepiece tubes are cast integral with the housings. This eliminated two separate brass tubing components that had to be fabricated for the earlier models. Another fabricating economy was made possible by the present die cast design of these components. Cast into the prism housings is the name and trade mark (each in one housing), which formerly required a pantograph engraving operation.

Cells are threaded to the objective housings (b) and properly aligned by use of eccentrics. These housings constitute the second half of the optical system which provides the original magnification. The eyepieces magnify the image formed by the objective, which gives the final magnification. (The function of the prisms is to shorten the actual physical distance between the objectives and eyepieces and to provide the stereoscopic image.)

ZINC and ALUMINUM

Die Castings

special department for
SMALL ZINC DIE CASTINGS



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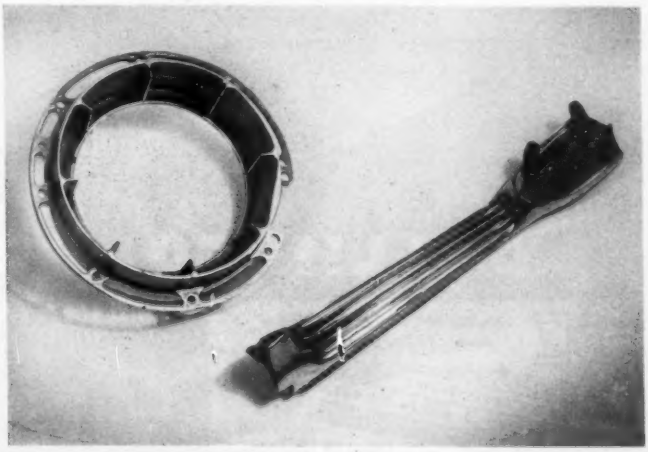
Instead of following tradition in the selection of a fabrication process for this product, the designer was guided by the requirements of strength, weight and appearance. The result: a superior product at lower cost.

CHROME PLATING ON ALUMINUM OPENS NEW FIELDS

STRINGED INSTRUMENTS have almost universally been constructed of wood because of special qualities of resonance and tone enrichment thus obtained. Wood is not, however, an economical material to fabricate, and it is subject to breaking, splitting and warping.

Where the structual components of the instrument do not affect its tone quality metal can be utilized to give a more durable, less expensive construction, and to permit certain special design features.

The Grossman Music Corp., of Cleveland, broke with the "wood" tradition in the design of the "Dixie" banjo-ukulele. The banjo-ukulele depends upon its calfskin head rather than on its shell for resonance. By examining the product in



The use of ribs to reduce necessary section thickness and to promote strength and rigidity is illustrated by these die cast parts. The ribs on the neck also serve as a thumb guide for the player. Red enamel is applied on the inside of the shell and between the ribs on the neck before assembly.

terms of the die casting process, therefore, the company found that its product could be made at a cost less than that offered by any other suitable means of fabrication.

The result is a musical instrument equal to any of its kind and superior to most now on the market, regardless of price. As a matter of musical fact, its tonal qualities, exceptional response and precision construction place it strictly in the class for professional playing. Besides, it will not warp out of shape to cause false or fuzzy tones. Rigid testing has shown that the die cast parts can be fractured only by violent impact and will withstand many times the abuse to which musical instruments are ordinarily subjected.

The three parts which are die cast constitute the majority of the entire assembly. They are the shell (the main body of the instrument), the tension hoop, which holds and tensions the calfskin head, and the neck —the projecting part which carries the strings.

Die casting was selected for these parts rather than wood fabrication because the complicated shapes can be formed at a considerable saving. Plastics were ruled out since they are too easily broken, and because warpage can not be tolerated if a constant tone quality is to be maintained. Aluminum alloy was selected for the castings as proper weight is a vital factor.

The shell is cast in one piece, with two flanges and eight stiffening ribs. The outer flange has 11 cored holes and eight cored slots. The inner flange is set at an angle to the shell wall for acoustical reasons. The eight stiffening ribs permit a thinner, lighter wall section, and also serve to stiffen the shell and eliminate the possibility of undesirable vibrations. Four holes are drilled in the side of the shell for attaching the neck. The only other machining necessary on this part is the tapping of two of the holes in the shell and flash removal.

The tension hoop, which has a patented holding and tensioning action, is cast with eight integral bosses on the inside diameter. Into these bosses studs are inserted which pass through the holes in the outer flange of the shell. By tightening or loosening the nuts on these studs, the tension of the head can be varied. The head-tightening action of the banjo-uke is much the same as that of a snare drum.

A WISE SELECTION OF DESIGN AND FINISH can combine to give a product the maximum in sales appeal. The severe and functional design of the banjo-uke is enhanced by the gleaming chrome plate applied.

Possibly the most critical from the standpoint of accuracy of all three die cast parts is the neck. Not only is exact spacing of the frets necessary in order that the notes produced will be true, but also the frets must be of even height. An objectionable humming or buzzing effect is caused by frets of non-uniform height. The frets in this case are die cast integrally with the neck, and their location is so accurate that the usually elusive harmonics can actually be played on this instrument. Another advantage of this arrangement is that the frets can not possibly work loose.

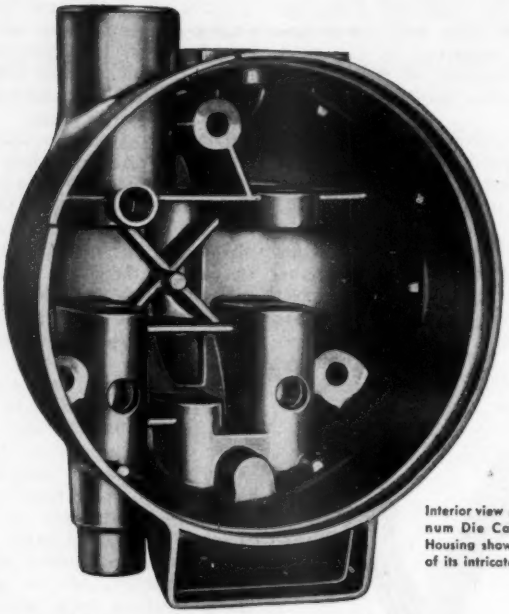
Longitudinal ribs on the back of the neck strengthen this member and also serve as a positive thumb guide for the player. Two holes are cored in the end of the neck and tapped to fasten the neck to the shell. The four screw arrangement, also patented, allows the neck to be adjusted to the user's liking in any direction.

Tensioning of the nylon strings is accomplished by four pegs at the end of the neck. Holes for these pegs are drilled rather than cored because a highly complicated mold would have been necessary to pull cores at the desired angle. The holes are counterbored and a conical washer set in place. These washers turn with the pegs and provide the proper friction. The brand name "Dixie" is formed in raised letters on the headpiece as an integral part of the casting.

Finishing the banjo-uke presented the company with some initial difficulties. The first finish tried was a copper plate. This proved unsatisfactory because of tarnishing caused by skin acids. Though the possibility of a lacquer coat was considered to prevent the tarnishing, this was rejected because of extra cost, and because the lacquer might wear off after a period of time and expose the copper plate.

The company decided to try a chromium plate, and this has proved satisfactory. Although chromium is not easily plated on die cast aluminum alloys, it has been accomplished with commercial success (Die Castings, October, 1950, page 58). The die castings receive a polishing-buffing operation, and are then plated.

After the chrome plate was



Interior view of aluminum Die Cast Gear Housing shows details of its intricate design.

Intricate Design is No Bar to Mass Duplication

Design engineers have learned over the years that component parts, extremely intricate in design, can be mass produced within close tolerances by the die casting process. They have found that MILWAUKEE has the knowledge, the experience, the technical skill, and the facilities to execute complex design to exact specifications.

The die-cast gear housing pictured above is but one in thousands of such intricate designs which are faithfully mass produced here at Milwaukee. Its smooth, streamlined exterior "covers" a multitude of "interior problems" involving die design, die construction and machine operation. Then consider the fact that die cast parts like this are delivered to the customer, in most cases, practically "ready for assembly."

Consider, also, the savings which accrue to the user of such parts... in machining operations... in assembly time... in buffing, polishing and finishing. Whether you're designing for military or civilian needs, remember that die castings by *MILWAUKEE* may be the low-cost way to mass-produce your most complex components.

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decided upon, further appearance improvement was gained by setting off the gleaming chrome surface with baked enamel. The company uses a red enamel which is applied over the plating on the inside of the shell, between the ribs on the back of the neck and around the raised letters on the front of the neck. The enamel is then baked on, and it does much to enhance the appearance of the final product.

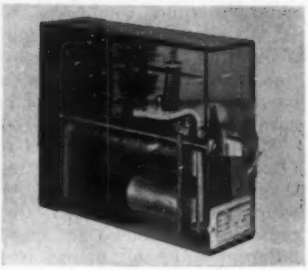
The ruggedness, remarkable tone quality and scale accuracy and the pleasing appearance of the "Dixie" banjo-ukulele are directly attributable to the use of the die casting process and the selection of a proper finish.

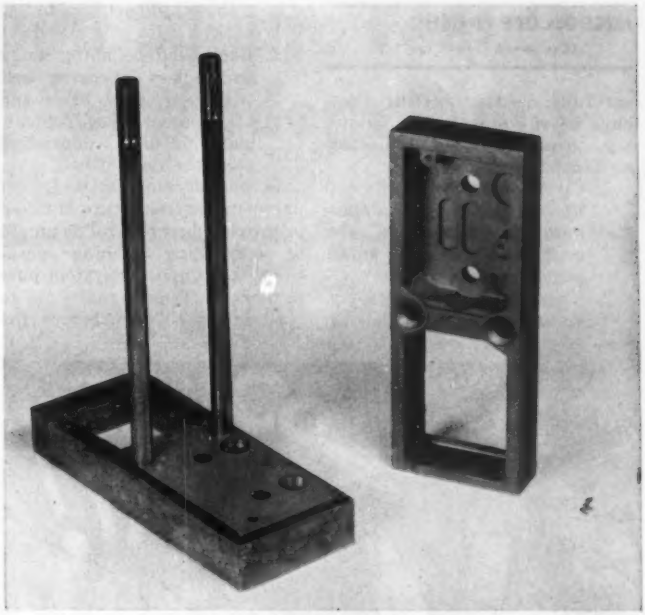
All three die cast parts of the banjo-uke are shown above. Once the die cast parts have been plated and painted, assembly of the complete instrument can be accomplished in a matter of minutes. The die cast parts make the banjo-uke almost indestructible, as compared with the fragility commonly associated with stringed instruments.

PROMOTED BY PENNSALT

Albert H. Clem has been appointed to the newly created position of assistant to the vice president in charge of sales of the Pennsylvania Salt Manufacturing Co., Philadelphia, Pa., it was announced by William P. Drake, vice president.

A graduate of Penn State, Mr. Clem joined Pennsalt in 1938 in the research and development division.





LIVES DEPEND upon railway signal devices such as the relay unit, *above left*. The die cast aluminum base is a durable, dimensionally-stable mounting piece which is made weather-proof by anodizing to obtain an inert oxide film on the surface. Abrasive blasting prior to anodizing presents a clean, uniform, receptive surface.

Abrasive Blast Plus Anodizing Yields Inert, Uniform Surface

By J. E. WILLING
Engineer
General Railway Signal Co.

CHOICE OF MATERIALS to be used in railway signal equipment requires the greatest care, especially in those critical components where changes in dimension, warping or breakage might result in defective signal operation.

Die castings have been incorporated in the railway signal systems made by our company for almost 20 years; one of the more recent of these applications is a die cast aluminum base adopted for one of our relays.

Relays are safety devices by means of which the movement of trains is controlled. It is obvious that in equipment of this type, deficiencies in materials specifications cannot be tolerated.

A high silicon alloy of aluminum, with superior corrosion resistance characteristics, is being used. Outside dimensions of this die casting which carries a load of almost 10 pounds are 2½"x6⅜"x1".

Finishing is at a minimum. The mounting surface is ground to assure a true, flat surface for attachment of the mechanism. Two bosses on the underside are drilled and tapped.

The die castings are abrasive-blasted prior to finishing to clean up the surface, remove flash and give a tooth for the anodizing treatment that provides an impervious oxide film against corrosion. The abrasive blast not only provides a slight tooth, but also increases the area of surface exposed to the anodic reaction.

To seal the relay against dust and moisture, a groove is provided around the perimeter of the die cast base to receive a rubber gasket and for mounting the transparent cover, as shown in Figure 1.

Several holes are cored in the mounting surface and two in the center reinforcing rib. Those in the top surface serve to mount the elements of the relay mech-

(Continued on Page 60)

MICROSCOPE FINISH

(Continued from Page 27)

carefully. After parting lines have been trimmed, the following three types of polishing equipment are used:

1. Circular stitched buffs set up with glue and aluminum oxide abrasive are used for removal of small amounts of metal.
2. Unstitched buffs with greaseless compounds for a smoothing action and fine oiling.
3. Backstand polishing using an endless abrasive belt with backstand idler and soft contact wheel for various finishes, depending upon the type of belt.

In the organic finishing department, extreme care is taken to provide dust control as an aid to painstaking finishing operations. A filtered air system puts in more air than is taken out to maintain positive pressure for eliminating dust conditions. Air is distributed through spun glass filters for equal distribution and as a second stage in removing dust and dirt. All paint spray booths are water washed.

Metal masks are attached to the individual parts during spraying to stop off areas on which no paint is wanted. Because of the demand for many different finishes, suction feed guns with small reservoirs are used, permitting easy changes in organic finish as different types of instruments are processed.

Batch-type, thermostatically-controlled ovens, both steam and electric, are used for baking paint on various instruments. Finishes are formulated to bake out at 300F for one hour. After baking the primer, filling is done if necessary and the filler is baked.

The prime coat is then scuffed with 400 grit paper to upset the surface and provide an improved tooth for the next coat. Scuffing also removes check marks and slight surface imperfections. The final coat of enamel is sprayed and baked.

Here is a production note which has been found valuable in our operation which requires close follow-up of numerous batches of different types of parts. One operator is responsible for all baking operations. This arrangement relieves spraying operators of the extra duty, and concentrates the responsibility in one person. For the same reason, one operator is responsible for all mixing and diluting of organic finishes to proper consistency.

All finishes are carefully evaluated in the laboratory and each shipment is checked for quality and conformity with company specifications. Every piece, when taken off the baking racks, is individually inspected and packed before being sent to the assembly department.

The same amount of electricity needed to produce five tons of aluminum will keep the lighted torch in the Statue of Liberty's hand burning for one entire year.

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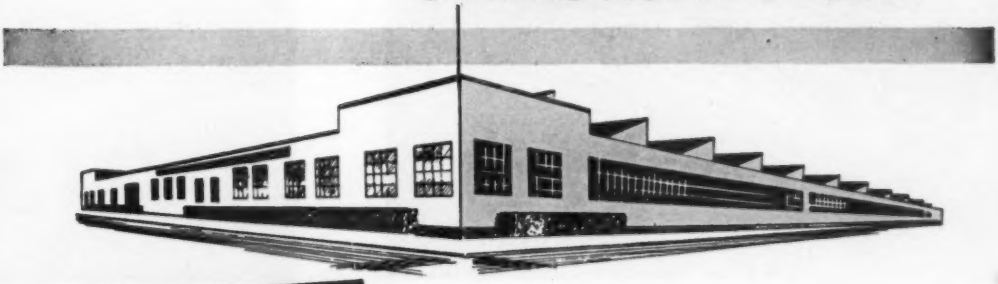

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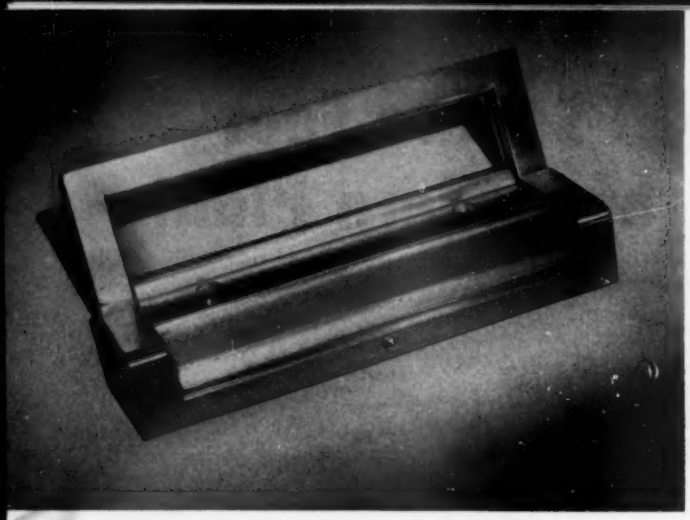


2. Bright brass plating proved to be impractical for this assembly due to color matching difficulties.

3. Satin brass, accomplis
cycle, was the second f

Difficulty encountered in matching color among five brass plated zinc die castings resulted in a change to a metallic hammer-type baked enamel. This solved the color matching problem, eliminated rejects, saved polishing and stepped-up the production rate.

How an Organic Coating Solved a Design Problem at Philco

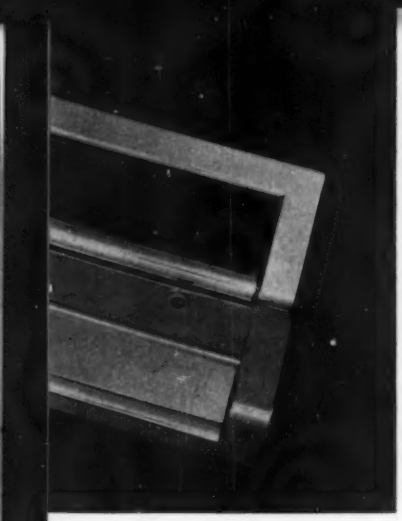
FEW industries are as conscious of the importance of proper finish as are the manufacturers of household electrical appliances.

Saleswise designers know the value of the right finish applied over the most appealing form. And, from another angle, the builders of radios, refrigerators, washing machines and other domestic devices are only too well aware of the importance of penny-paring in this sharply competitive consumer market.

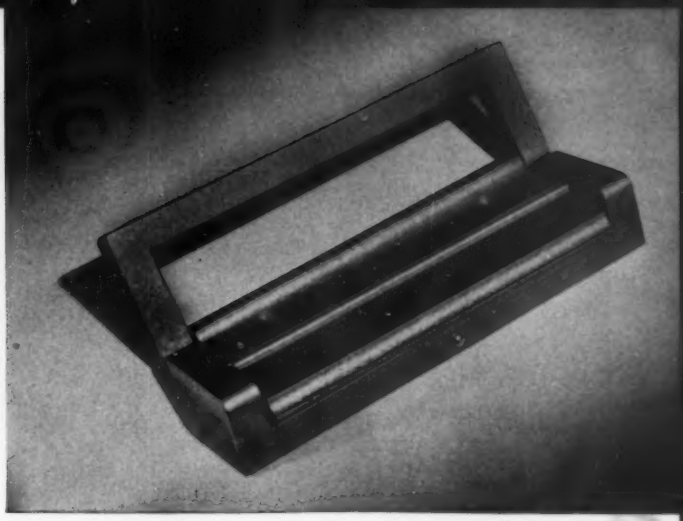
But one phase of the finishing specification that often gets too little attention is the close relationship between the shape of the components and their finishability.

A handsome plated finish that has the customer reaching for his wallet may also have the production foreman reaching for his axe when the percentage of rejects rises above normal due to the difficulty of achieving the desired complexion on an important part.

A slight change in contours, a blending of intersecting planes, a softening of corners or the ra-



ed by a different polishing
ish attempted on these parts.



4. Most successful finish is the metallic hammer-type baked enamel with a coating of clear baked lacquer.

diusing of recesses may be the method by which a designer can assist the finishing operation without sacrificing anything of the product's appearance.

On the other hand, a change in the methods of flash removal, a different buffing or tumbling cycle, a variation in paint specification or a different pre-plating treatment may be worked out by the process engineer in order to get the needed results.

Handle Assembly Provides Interesting Case History

A pertinent case history demonstrating the close relationship between part design and finish specification is that of the handle assembly for a portable radio, Figure 1, manufactured by the Philco Corporation.

This is an ingenious mechanical design in which five zinc alloy die castings are assembled in such a way that they form the carrying handle, tuning dial escutcheon and cover plate for the dial. The entire assembly of metal parts, two of which are hinged, requires only three small Phillips head screws and four Speed Nuts. Utilization of die cast bosses and cored holes, accurately formed and located, has made this possible.

Although machining operations are almost eliminated on this assembly, it does present some critical finishing problems due to the styling.

The original design called for a handle assembly constructed of steel stampings dressed up in a bright brass plate. The shapes of the various components, however, proved impractical as stampings and the parts were then drawn up as die castings.

This solved the fabrication problem; the requisite sharpness of detail, reentrant angles, square shapes and special assembly features could all be obtained.

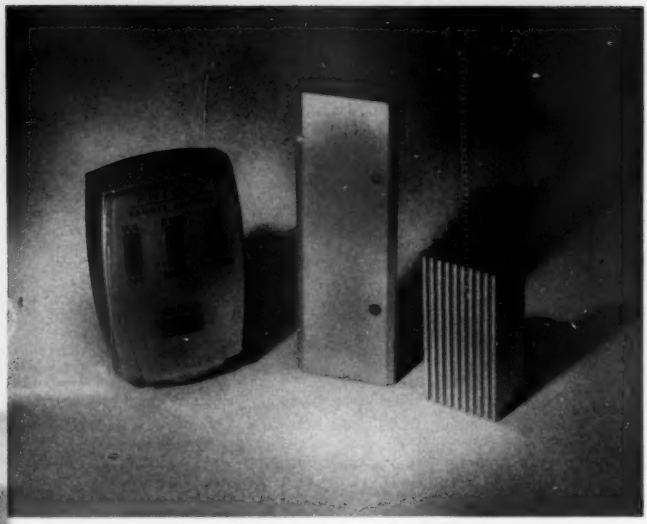
1. Styling of this Philco portable radio emphasizes the strength and solidity of the metal handle assembly. The die cast dial cover snaps open and the radio starts to play when the small latch button is pressed.

In attempting to get the bright brass plate that was specified, the finishers ran into certain difficulties. One of these was the exact matching of color and surface among the different components. There are several reasons for these variations.

The dial cover and handle halves are polished along their length, whereas the escutcheon on which they are mounted must be polished crosswise due to its shape. In some instances, the surface texture was noticeably different between the castings polished at right angles to each other.

To obtain close color match among brass plated parts that have been processed at different times is also a problem. Several factors in the plating operation must be controlled within extremely narrow limits in order to produce an exact color match. Thus, a small variation in temperature, bath composition or current density from one batch to another might well produce a slight, but noticeable, color variation.

This difference in color may also be produced by the lacquer coating used over the brass to protect it from perspiration and



5. SUCCESSFUL BRASS PLATING of these three zinc die cast television parts is due to the design of the parts for this specific finish. Remote control unit, *left*, is bright brass plated with lettering filled with a dark paint. The door pull and mounting escutcheon, *right*, have a satin brass plate, lend themselves to ease of polishing, and offer no color-matching problem.

6. NAME PLATES are often die cast in zinc because of the well-defined lettering which can be obtained. The center piece is painted with hammer-type enamel and the other two are plated in brass. Lettering is filled with white paint in each instance.

atmospheric corrosion. Here a double coat of a clear phenolic lacquer was applied over the bright brass and baked at 265F for 30 minutes. However, slightly higher heat or a somewhat thicker application of lacquer tends to affect the color.

Thus, matching of castings was made difficult due to elements in the polishing, plating and lacquering cycle. If the castings had been shaped in such a way that polishing could be done in one direction, or if only single die castings, rather than an assembly of several had been involved, then bright brass plating could have served.

An additional problem not connected with design was a problem of spotting through the brass. The sensitivity of brass to spotting or staining due to external agents, or some condition of the base metal, resulted in an excessive percentage of rejects.

The bright brass plated handle assembly first attempted is shown in Figure 2. In an attempt to retain brass finish, a variation of the polishing and buffing cycle was tried to produce a satin finish brass. For this, a Lea No. 13 compound was followed with a Matchless No. 7, producing the attractive lustre shown in Figure 3.

However, the same problems still plagued the plating room with regard to the revised finish, and a third solution was sought. For this purpose, a metallic type of finish that is well suited to die cast surfaces was selected.

A hammered type synthetic enamel with a metallic brass sheen was found that would adhere to the die cast surfaces, would cover slight surface flaws such as sink marks or flow marks and would permit retention of the design features.

Preliminary polishing and buffing have been dispensed with and only one coarse wheel operation is needed. The castings get a phosphate dip to prepare the surface and promote paint adhesion. The paint is an alkyd type baking enamel con-

(Continued on Page 63)

FINISHING DIE CASTINGS

A SECTION DEVOTED TO THE FINISHING PROCESSES

MACHINING—Most die castings require some machining operations. In this section will be found information to aid in planning and selecting the proper method and equipment for these operations.

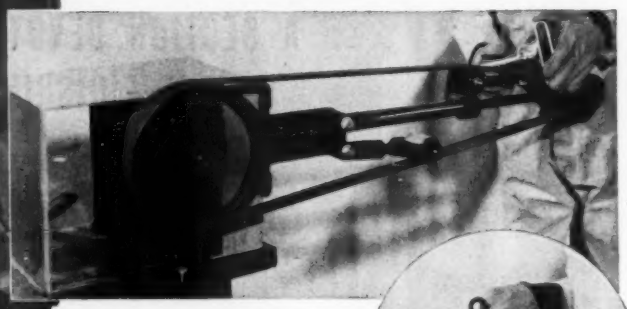
ASSEMBLING—Die castings are generally assembled components. This section includes information on fastenings and methods for mass production assembly operations.

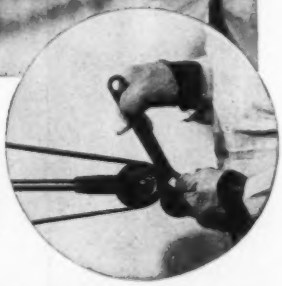
SURFACE FINISHING—Most die castings receive some type of surface finish such as plating, organic coating, anodic coating or chemical coating. This section contains information on the methods, processes and equipment used for the various surface treatments on the die casting alloys.

The sky's the limit . . .

in belt backstand adaptability

Take this yoke sander, typical of BEHR-MANNING Product Engineering. This arrangement used vertically, is a quick and easy way to finish inside contours such as the auto horn ring in the photo, which was previously finished with a hand-held grinding unit. . . . Used horizontally, this sander becomes an ideal way to finish close contours on the free-running BEHR-MANNING belt, as in the photo below. . . . Or to grind short radius curves against the small contact wheel, as in the wrench job at the bottom of this page.





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for finishing die castings

A monthly digest of current technical progress selected and prepared by the editorial staff of DIE CASTINGS. This section is devoted to finishing processes for all types of die castings, and is written specifically for the benefit of the production man.

ALUMINUM CLEANING (PART TWO)

By D. F. SEYMOUR
The Diversey Corporation

The use of high flash point solvents to which have been added emulsifiers—the resultant product is called an emulsion solvent or emulsion cleaner—is in many cases the most economical and effective way of employing solvents.

Emulsion cleaners should not be confused with alkaline cleaners whose cleaning ability depends upon emulsification, upon their ability to emulsify soil. Emulsion cleaners are solvents. They are, generally, high flash point solvents. The high flash points minimize fire hazards and are characteristic of low vapor pressures which, converted to applicable benefits, mean low evaporative losses and a minimum of atmosphere contamination.

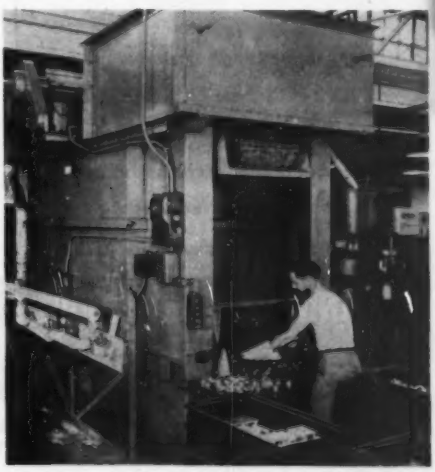
Emulsion cleaners do not leave solid residues in a dried state. The low rate of evaporation and the emulsifiers and wetting agents cause the solid matter to remain thoroughly wetted until subsequently removed in an alkaline cleaner or spray rinse.

Emulsion cleaners find application where embossed designs entrap buffing compound. The emulsifying action of alkaline cleaners is, in many cases, too slow in removing such caked soil whereas the solvent action of emulsion cleaners is considerably faster. Subsequent immersion or spraying of the work in alkaline cleaners and rinsing produces a degree of cleanliness perfectly applicable to such finishing operations as anodizing and dyeing, electroplating or organic finishing.

Emulsion cleaners can be used as received, diluted with some other solvent such as kerosene or mineral spirits or diluted with water. The emulsifiers present in the cleaner suspend the cleaner in the water in the form of a creamy emulsion. As a water emulsion, emulsion cleaners are generally used in spray washers at concentration of 1 to 5 per cent and temperatures up to 180F.

Where the emulsion cleaner is to be used in a soak operation, it is worth while determining whether or not dilution with another solvent may not be beneficial from a cleaning standpoint and at what percentage dilution, if any, the greatest benefits are derived. Operations have been encountered in which one degree of dilution was decidedly better than any other and considerably better than either the cleaner or the diluting solvent alone.

The third type of cleaners commonly used in the aluminum industry is the acid type and this major type may be divided into several sub-types depending upon the results desired. If the



A MAJOR PRODUCER of die castings uses this efficient Blakeslee vapor degreaser for bulk cleaning of small intricate-shaped die cast parts. Photo courtesy G. S. Blakeslee & Co., Chicago.

aluminum is to be spot-welded, acid materials known as deoxidizers are used.

Removing the electrically-resistant oxide from the surface of the alloy and inhibiting its reformation for a period of time compatible with the rate of processing overcomes the difficulty of non-uniform spots. Deoxidizers are acid materials which dissolve the oxide from the aluminum surface without perceptible attack on the unoxidized metal.

The available deoxidizers perform this operation with varying degrees of effectiveness and under varying conditions of operation. Some are used at temperatures up to 180F. while others are used at room temperature (70-80F). Some are used more dilute than others. Some can be used in mild containers while other require acid resistant ones. As to results, a deoxidizer should be selected for its ability to remove aluminum oxide *completely* in a reasonable period of time (5-6 minutes for most alloys and 10-12 minutes for the most difficult heat treated alloys), produce a smut free surface and allow a satisfactory holdover period.

As with any process material, it is desirable to investigate the available aluminum deoxidizers for solution life, ease of maintenance, maintenance requirements, and the toxicity of components or end products.

One very important point to consider with aluminum deoxidizers is the control of treating time that is required. With some, the surface oxide is quickly removed from the aluminum surface but almost immediately after attainment of a minimum surface resistance a new film is created which causes the resistance to increase to and beyond its original value. The human element enters the operation in which a deoxidizer of this type is used and erratically timed immersion intervals or variations in aluminum results in non-uniform surface resistance and large coefficients of variation in weld strengths. The only feasible deoxidizers are those which quickly remove the oxide, produce a minimum surface resistance, and then become inactive —hold the minimum resistance for long periods in excess of the optimum treatment time.

LARGER DIE CASTINGS such as outboard motor housings and cylinder blocks, gas meter housings and washing machine agitators can be washed and rinsed on this type of two stage conveyorized unit. Photo courtesy G. S. Blakeslee & Co.

Another important application of these deoxidizers used for the preparation of aluminum alloys for spotwelding is the removal of water marks. Water marks are difficult to remove because they affect a discoloration of the oxide film. Non-etching or inhibited cleaners do not remove them. If the water marks are not imbedded in the alumi-

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num metal under the coating of the natural oxide, treatment with a deoxidizer will remove the oxide and the water mark.

In addition to the removal of aluminum oxide prior to spot welding, deoxidizers of greater activity are used to remove oxide from aluminum racks used to suspend work in anodizing tanks. An oxide film is built up on them just as on the work. After being used a few times, the number being dependent upon the characteristics of the operation, the contact points of the rack become completely coated with the oxide coating, a dielectric, and subsequent pieces of work mounted on the rack do not complete the electrical circuit and are not anodized. To be again usable, the rack must be stripped of the oxide.

As with all fabrication and finishing operations, anodizing operations produce rejected work which can be salvaged by stripping the anodized coating and reprocessing.

The first, and still used to some extent, stripping medium was caustic soda. Caustic solutions react violently with aluminum oxide and just as violently with unoxidized aluminum. Fast stripping is accompanied by tremendous losses of sound aluminum resulting in short rack life.

The desirable oxide stripper or deoxidizer is one which will remove the oxide coating quickly, will not attack unoxidized aluminum, will not leave a smut, is easily controlled as to optimum operating concentration and has a solution life of sufficient length to be practical and economically feasible. Elimination of pitting and etching reduces the amount of reprocessing required. It is, in the majority of cases, possible to reanodize and dye without rebuffing, a considerable reduction in salvage cost.

The desirability of a smut free surface on both work and racks is well known to metal finishers. True smuts are difficult to remove even when spray washers, spray rinses and electrocleaners (for steel, copper, zinc die castings) can be employed. They often require hand wiping. If smut occurs on racks, normal handling will result in contamination of everything associated with the various operations. The best solution to a smut problem is the prevention of smut formation and this is possible in most aluminum oxide stripping operations.

In the case of aluminum die castings, the high silicon content, of course, causes smut formation in spite of all precautions. However, silicon smut is readily soluble in the various acid dips containing hydrofluoric acid, as previously described. Brief immersions (possibly 30 seconds or less) will do a completely satisfactory job.

Ease of control of these deoxidizers is extremely important. Some of them are made up by the addition of two or more materials to the tank and unless control is maintained, the components are quickly out of bal-

Up to 50% production increase on large hole tap jobs!

THE PROCUNIER
NEW! LARGER!
Procunier
"TRU-GRIP" Tap Saver
Compact size makes tapping easier close to walls or shoulders, eliminates "chewed" tap shanks. Lighter, smaller in diameter, it drives the tap by the square, holds it true by the round.

— with NEW Procunier "TAP KING" Heavy Duty Tap Head

This revolutionary new Procunier "TAP KING" will change every idea you've ever had about **large hole** production tapping! More and more users are finding that it slashes costs . . . makes possible sensational increase in production on difficult large hole tapping jobs! Spectacular daily **production gains** have run **as high as 50% to 100%!** In addition, users reported amazing savings in parts spoilage and consistent, accurate maintenance of uniform tap depth . . . even on large **blind hole** tapping jobs!

Construction features include: capacity 3/8" to 1" in steel and 1 1/8" in softer materials; powerful friction clutch, exclusive spline drive to tap holder spindle; ball and needle bearings; rigid lightweight "TRU-GRIP" tap holder; helical back gear reversing mechanism; lightweight aluminum housing and many other unusual advantages.

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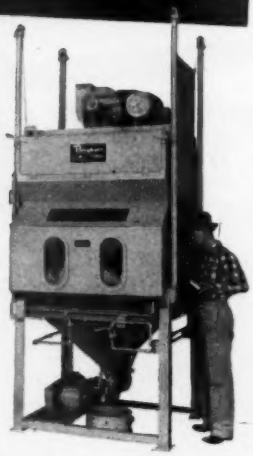
Prolong the life of your DIES with PANGBORN Hydro-Finish!



PANGBORN Hydro-Finish prolongs life of expensive Tools and Dies by cleaning and polishing to a precision tolerance of .0001". Jobs that formerly took hours are done *in minutes* with *Hydro-Finish!* Fine mesh abrasives are used to clean and improve surface of die casting dies, rubber and glass molds, forging dies, and deep drawing dies, without excessive metal removal.

Dies are clean, rapidly produce hardware finish and give maximum production without expensive hand maintenance! One man alone can operate a Pangborn Hydro-Finish machine.

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BLAST CLEANS CHEAPER
with the right equipment for every job

Circle No. 43 on Reader Service Card

ance and poor stripping accompanied by etching is the result. Generally, control of these solutions require two or more analytical determinations of more complexity than the usual titration for cleaner concentration.

Greater ease of handling and simpler control characterize some of the proprietary deoxidizers. Only one material need be added to the tank and its formulation is such that use does not cause an unbalanced condition of the components. One simple titration determines the concentration from which the required additions of the deoxidizer can be made to maintain optimum operating concentration.

A second type of acid cleaner for aluminum is that based on phosphoric acid or phosphates and whose objective is the preparation of surfaces for organic finishes—paints, enamels, etc.

These materials vary in the degree of acidity, the ability to remove soil such as greases and oils, and in reactivity with the aluminum surface. Some of these acid cleaners are formulated with phosphoric acid, others with salts of phosphoric acid. All are acid in that their pH's are below 7.0 and the degree of acidity varies from those containing the greatest concentration of phosphoric acid to those containing the most nearly neutral salts.

In comparison with such cleaners as alkaline soak tank materials, these acid type materials are poor cleaners. Normally they cannot be used for bulk soil removal. They contain wetting and emulsifying agents in varying concentrations and of varying degrees of effectiveness, but if more than thin films of soil are encountered, a precleaning operation such as an alkaline soak or spray operation followed by a rinse must be used. Some contain small concentrations of solvents but even those are none too effective in removing soils.

The real purpose of these phosphoric acid or phosphate cleaners is to react with the aluminum surface in such a manner as to improve the adherence of subsequently applied organic finishes.

The more acid materials, those made from phosphoric acid, produce an etched surface. The microscopically roughened surface makes possible a mechanical keying of the paint film which improves its adherence. Very little, if any, forma-

(Continued on Page 57)

FOR THOROUGH WASHING of the die cast parts, proper design of the spray nozzle and the arrangement of the spraying pattern are most important. Shown above is a patented adjustable nozzle from G. S. Blakeslee & Co.

ENAMEL FILL OR ENAMEL COAT
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"Like finding extra screws in every box!"

"At a time when a shortage of screws can very well set the limits of production, P-K* quality is more important to us than ever. Every screw is formed and hardened properly to drive right and hold right. There are no 'duds', and, believe me, that's like finding extra screws in every box!"

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P-K Assembly Engineers will help you in every way possible to adjust your assemblies to limited supplies. You may be able to use standard screws in place of hard-to-get "specials". By simplifying assemblies, you can sometimes use fewer screws without sacrifice of strength. Reducing multiple head styles, and using fewer diameters, with longer or shorter screws as needed, will also often help you to get improved deliveries.

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The Original
PARKER-KALON* SELF-TAPPING SCREWS

A TYPE AND SIZE FOR EVERY METAL AND PLASTIC ASSEMBLY

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Station One: the bases are loaded in the machine from a chain driven magazine. The work loader, mounted on the main tool slide, is driven by a pneumatic cylinder.

•

Station Two: the inside diameter of the outer end is core drilled, and the larger outside diameter turned (2B).

•

Station Three: the smaller outside diameter is turned (3A), the inside diameter of the outer end is chamfered, (2A), the outer end of the shaft faced (3B) and the step between the two outside diameters is also faced (3C).

•

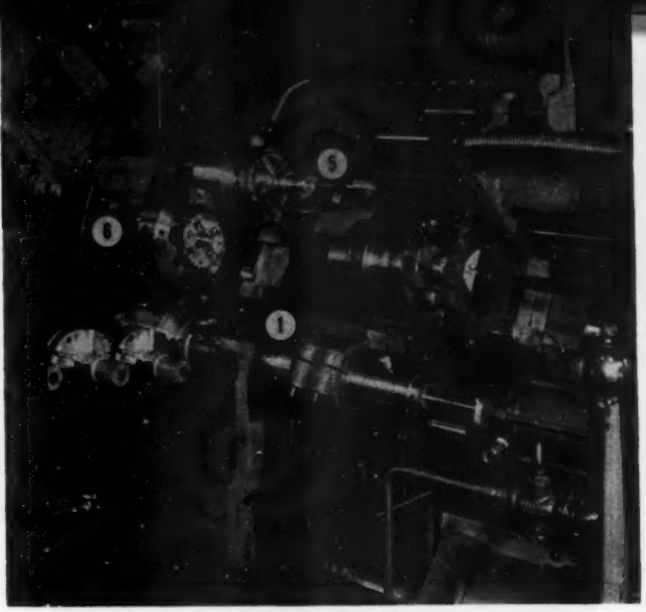
Station Four: a spring loaded support is used to aid in holding a very close dimension. A shave tool finishes the smaller outside diameter (4A) turned at station three. The shave tool is free to float in its holder and is opposed by a roller. The close tolerance is held between the cutting edge of the tool and the outside diameter of the roller. Also in this position the flange is turned (4B).

•

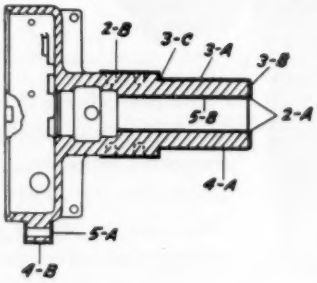
Station Five: a straddle facing tool straddle-faces the flange and chamfers the two edges of the flange (5A), and a single point bore on a boring bar with a 2½:1 drill speeder finishes the inside diameter of the shaft (5B).

•

Station Six: The work is automatically unloaded and is put in a magazine to be fed into the second operation machine.

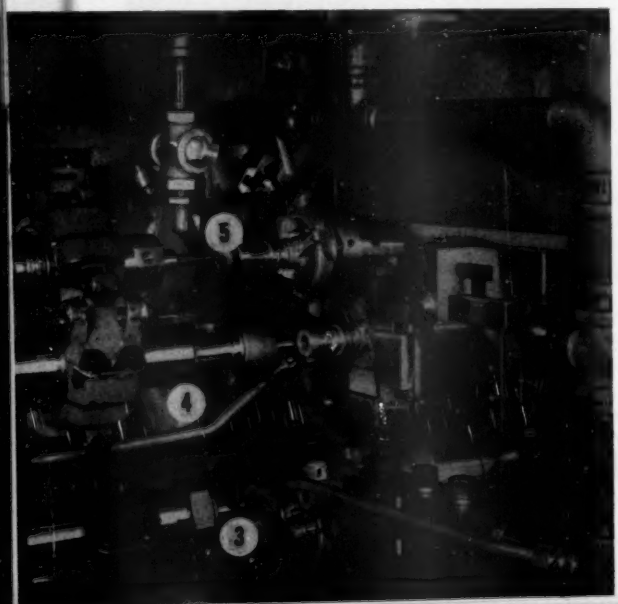


FIRST OPERATION MACHINE: STATIONS 1, 5 AND 6.



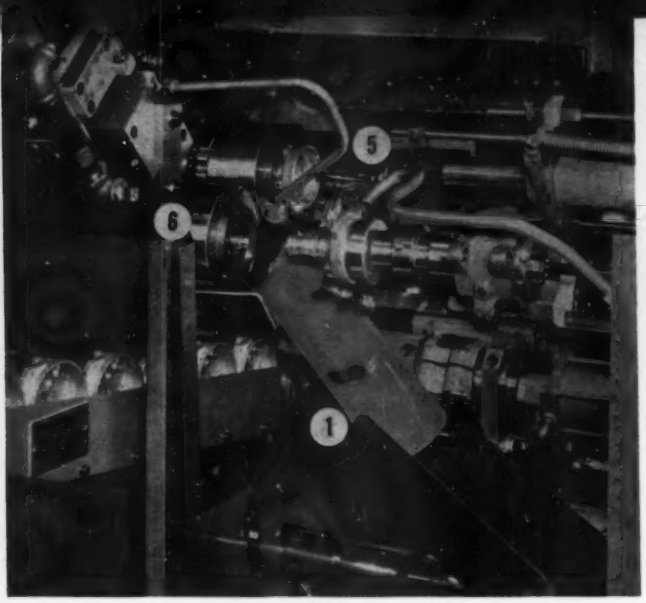
18 MACHINING WITH TWO

FIRST OPERATION MACHINE: STATIONS 3, 4 AND 5.



ONE OF the country's largest automotive manufacturers uses an aluminum die casting in the distributor of the ignition system. Since the timing and the general reliability of the ignition system depend largely upon the accuracy of the distributor, some of the dimensions, including those on the die cast base, have to be held to very close tolerances.

Some very close tolerances are specified for the casting itself. Several holes as small as 0.131 are cast, with location tolerances of ±0.003. Several tolerances specified, however, are as small as 0.0005, and it has been found



SECOND OPERATION MACHINE: STATIONS 1, 5 AND 6.

Station One: the loading operation is the same as that on the first machine, with a chain driven magazine and a pneumatically operating loader.

•

Station Two: a large multiple tool head goes into the base end of the piece, finish faces the three flats (2A), chamfers the beginning of the shaft hole (2B) and faces the outer end of the base (2C).

•

Station Three: a boring bar mounted on a 2½:1 drill speeder finishes the steps on the inside of the shaft hole (3A). At the same time a chamfering tool comes in and chamfers the outside edge of the face (3B).

•

Station Four: a recessing tool cuts the recess in the shaft hole (4A). The recessing tool is a form tool which is actuated by the movement of the end slide or turret. When the tool reaches the proper depth in the hole it is held back by a hold-back rod. The turret keeps moving, bringing the tool holder against a flat-faced cam, which in turn moves the tool laterally so that it feeds into the work. When the recess has been cut to the proper size, the tool returns to center and is withdrawn. Also in this position a facing tool finishes the face of the piece (4B).

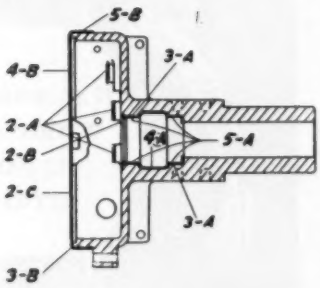
•

Station Five: a reamer is used to clean up the inside diameter of the shaft hole (5A), and a turning tool turns the outside diameter of the piece (5B).

•

Station Six: The work is automatically ejected into a work chute.

OPERATIONS MACHINES

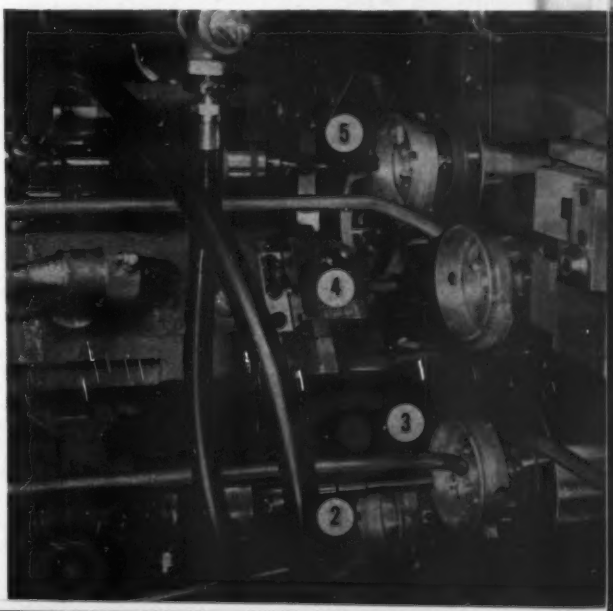


necessary to perform 18 machining operations on this part.

Since this item is in mass production, these 18 operations must be performed quickly. The company uses two automatic, magazine-fed, six-station New Britain-Gridley machines to do the job. Both machines are horizontal, automatic indexing machine tools, and each of them does nine separate machining jobs.

The number of operations on the piece, the tolerances held and a production rate of 600 pieces per hour are a good indication of the value of automatic tools to high speed production.

SECOND OPERATION MACHINE: STATIONS 2, 3, 4 and 5.



News about UNICHROME Trade Mark COATINGS for METALS

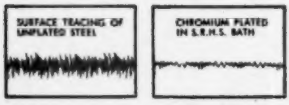
New dip produces glossy dense black finish

Newly developed Unichrome Dip for zinc offers you an unusual, dense black *metallic* finish that has all the appearance of black *enamel*. It has a uniform depth of color, good gloss. It increases the rust resistance of zinc plated steel and withstands a fair amount of wear. Suggested uses: As an attractive product finish to cut costs; as a corrosion inhibiting finish; as a *quality* replacement for black nickel. Write for more information. NOTE: Available in uniform olive drab, too.

Anozinc process toughens "skin" of zinc

A yellow conversion coating for zinc plate which provides superior corrosion protection and good wearing qualities is produced by Anozinc*. An electrolytic process, Anozinc permits fast, continuous, full automatic production setups. The finish meets government specifications. *Trade-Mark

Hard chromium plated SMOOTHER as well as *faster*



The unique "leveling action" of the Unichrome S.R.H.S. Chromium Solution smooths over minor surface irregularities, as the above surface traces show. Thus, not only do you save 20% to 30% plating time with this high speed bath, but also require less finishing of the plate.

BRIGHT FINISHING IS NO PROBLEM

with this Unichrome Dip Finish for zinc

Having trouble getting materials for bright finishing? Then consider this: Zinc processed in Unichrome Clear Dip equals more costly and scarcer finishes in sales winning appearance.

It also goes further. (You need deposit only .0003" of zinc to produce this finish). Furthermore, it has superior rust resistance, which is fortified by the corrosion protection of Unichrome Dip. And even if you could get all the finishing materials you need, the Unichrome Dip Finish still would be your best bet for *economy*.

ECONOMICAL CHROMATE-TREATING, TOO

In money-saving dilutions, Unichrome Dip provides a yellow, chromate finish. By switching to this from the "home made" solution formerly used for die castings, a large automotive supplier not only saved 50% on material costs alone, but also gained helpful "U.C." finishing service.

A chemical treatment, the Unichrome Dip process produces its finish integral with the zinc in 5 to 20 seconds. The solution is easily controlled and adapted for long use in manual or automatic equipment. The finish is an excellent base for lacquers and synthetics. In fact, Unichrome Clear Dip Finish topped with a Unichrome Clear Organic Coating is being adopted by companies as today's best way to still give customers a finish with high grade brightness and great lasting quality.

Scarcities or not, it will pay you to have all the facts on Unichrome Dip. Write us today. Remember, when it's a question of finishing metals, you can always count on "Coatings for Metals Headquarters" for help.

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USEFUL LITERATURE

For additional information on the products appearing on this and the following pages, mark the key number of the item on the card bound into this issue. Drop the card in the mail—no postage is required.

144 MASKS FOR INDUSTRIAL FINISHING:

"Scotch" brand masking tapes pre-cut to size and shape are made by the Brady-Milwaukee Co., Milwaukee, Wis. These masks stick without moistening and are quickly removed. Samples and literature are available from the company.

145 O-RING TYPES AND COMPOUNDS:

Dimensional and physical data for a series of precision molded industrial O-ring types for air, water and hydraulic use are given in a 48-page brochure offered by the Parker Appliance Co., Cleveland. A section is devoted to gland design and dimensioning, characteristics, application and installation.

146 PLATING IMPROVED BY NICKEL ACTIVATOR:

Chrometex, a nickel activator which aids in covering deep recesses of nickel with chrome plate, is described in a data sheet available from MacDermid, Inc., Waterbury, Conn. This product is said to reduce or eliminate positive nickel in the plating solution, resulting in bright chrome plating over the entire article being plated.

147 IMPROVED VISIBILITY IN PLATING TANK:

White Tygon tank linings manufactured by the Plastics and Synthetics Div., U. S. Stoneware Co., are said to give improved visibility in the plating tank, reducing the danger of fallen parts remaining undetected until the solution is contaminated.

148 ELECTROCLEANING DIE CAST PARTS:

"An Introduction to Electrolytic Cleaning" is the title of a booklet offered by the DuBois Co., Cincinnati. This is an enlarged edition containing a new section on the cleaning of die cast parts.

149 DIE CASTING FACILITIES:

A photographic presentation of their facilities for producing zinc and aluminum die castings is contained in a folder issued by Advance Pressure Castings, Inc., of Brooklyn, N. Y. Also illustrated are some of the parts which the company is now die casting.

150 MELTING AND HOLDING POTS FOR DIE CASTERS:

Pots for melting non-ferrous metals and holding pots for die casting machines are illustrated in a leaflet issued by the Acme Foundry Co., Detroit. The company makes pots to the operator's patterns.

151 ELECTRIC BAKING AND PROCESS OVEN:

An oven constructed of pre-fabricated electric panel units is described in literature available from the Advance Heating Div., Jensen Specialties, Inc., Detroit. The units can be used to extend existing systems (oil, gas, electric or steam) or to fabricate new installations.

152 DRILL AND TAP CHUCKS:

Prices, illustrations, specifications and engineering data on drill and tap chucks are contained in Bulletin No. 1-50, offered by Scully-Jones and Company, Chicago. Together with ten other bulletins, No. 1-50 replaces the Scully-Jones Engineering Manual 500.

153 BIT HOLDER FOR PHILLIPS SCREW DRIVING:

The Hy-Pro Phillips insert bit holder, designed to accelerate and aid in production line driving of Phillips recessed head screws, is illustrated in a folder published by the Continental Screw Co., New Bedford, Mass.

154 LATHE AND GRINDER CHUCKS:

Speed collet chucks for tool room lathes, engine lathes and grinders are covered in Bulletin No. 8, offered by Hardinge Brothers, Inc., Elmira, N. Y. The bulletin gives engineering specifications and illustrations of each chuck for the various types of spindles.

155 DRY-TUMBLING BARREL PROCESS:

The Tumb-L-Matic dry process for barrel deburring, burnishing and polishing is explained in Bulletin No. LS-50, available from Tumb-L-Matic, Inc., New York City. Recommendations for the correct barrel, barrel speed and media for given jobs are included.

156 CLEANING COMPRESSED AIR:

The Aridifier is a device for the removal of oil, moisture, dirt and other impurities from compressed air lines. A complete description of the unit and its capabilities, together with engineering and ordering data, is contained in Bulletin No. 1150, published by Logan Engineering Co., Chicago.

157 FIRE-RESISTANT HYDRAULIC FLUID:

Ucon hydrolubes 200-N, 300-N and 550-N are hydraulic fluids designed for use in die casting machines and other industrial equipment where danger from fire exists. They are described in a 12-page booklet available from Union Carbide and Carbon Corp., New York City.

28 DIE CASTING DESIGN:

"Hints for Designing Good Die Castings" is the title of a booklet published by the Hoover Co., North Canton, Ohio.

159 SMALL INTERLOCKED DIE CASTINGS:

The Intercast process, used by the Gries Reproducer Corp., New York City, to produce interlocked die castings of less than ½ ounce in one operation, is explained in a company bulletin.

NEW PRODUCTS

For additional information on the products appearing on this and the following pages, mark the key number of the item on the card bound into this issue. Drop the card in the mail—no postage is required.

SMALL BLAST CLEANING UNIT SUITABLE FOR DIE POLISHING

No. O Type EZ Hydro-Finish Blast Cabinet
Pangborn Corp., Hagerstown, Md.

SPECIAL FEATURES: A small, portable wet-blast abrasive cleaning. Uses include pre-heat treat and final polishing of dies. Operates from either ¼ inch compressed air line or compressed gas bottle. Can be mounted on bench or on pipe legs. Claimed to hold tolerance within 0.0001.

SPECIFICATIONS: Weight, 40 pounds. Blast chamber diameter, 15 inches. Uses abrasives to fineness of 5000 mesh. Power requirements, 110 volts, AC, 5 to 20 cfm of air at 80 psi. Two blast nozzle sizes. Loading is through top. Left and right hand holes. Knee-operated quick-opening valve. ½-gallon glass slurry bowl.

For additional information circle No. 92 on the Reader Service card.

FINISH ADHERES TO DISSIMILAR METALS

Rexadhere
Rexton Finishes, Inc., Irvington, N. J.

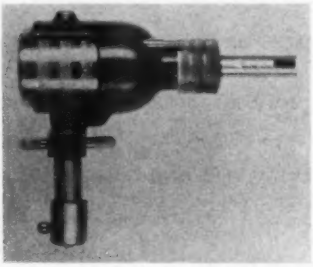
SPECIAL FEATURES: This industrial finish has unusual adhesion on a wide range of metal surfaces, such as cadmium, magnesium, chromium and zinc. It is said to eliminate special pretreatments and to offer the user a single primer for all metal surfaces.

SPECIFICATIONS: This is an air dry finish that can be used either as a primer or topcoat. When used as a primer it can be topcoated with either air dry or baked finishes. It can be sprayed or dipped on, or roller coated. It is available in black, gray, gunmetal or clear. Samples and other specifications sent on request.

For additional information circle No. 93 on the Reader Service card.

TOOL AND DIE FILING MACHINE

Diprofile
Nord International Corp., New York City



SPECIAL FEATURES: Used for filing, honing, polishing and lapping on inner and outer surfaces. Works on practically all materials. Carbide and hard metal tools can be sharpened without removing them from holders. Diprofile is a product of Sweden.

SPECIFICATIONS: Driven from 10,000 rpm controllable motor of 1/10 to 1/8 hp. Drive is through flexible shaft that also takes other handpieces. American-made motors are not supplied unless requested. A variety of tools is available to enable the user to select whatever he needs to accomplish a particular purpose. The tool has an adjustable stroke for shallow work, and can be mounted on a lathe for work on rotating surfaces.

For additional information circle No. 94 on the Reader Service Card.

PORTABLE ELECTRIC OVEN

Model CR-1
Grieve-Hendry Co., Inc., Chicago.

SPECIAL FEATURES: Used for baking enamels, lacquers, wrinkles and other finishes, and for drying parts after cleaning. Ovens can be stacked on one another and operated singly or as a unit. Holds temperature closely without stratification.

SPECIFICATIONS: Steel construction. Asbestos air-cell insulation. Uses 110 volt outlet (DC units available). Inside size 29" x 24" x 20½". Removable shelf. Fan driven by 110 volt, single phase motor. Heats to 225°F in 15 minutes. Larger, higher-temperature models available.

For additional information circle No. 95 on the Reader Service card.

BRIGHT CHROME DIRECTLY OVER ZINC PLATED DIE CASTINGS

The Wire Coating and Manufacturing Co., Cleveland, Ohio

SPECIAL FEATURES: Eliminates need for war-restricted copper and nickel for underplating bright chrome on such metal parts as zinc, aluminum and magnesium base die castings as well as steel parts. Materials for the new process became available in large quantities on March 1. Application for patents on this process have been filed.

For additional information circle No. 96 on the Reader Service Card.

CARBIDE DIE-MAKER'S TOOLS

Di-Car Set No. 40

Severance Tool Industries, Inc., Saginaw, Mich.

SPECIAL FEATURES: A set of eight ¼ inch shank rotary finishing tools designed specifically for the tool and die maker. Cuts, tooth patterns and shapes were selected to give widest possible range of usefulness. Tools are made of solid carbide, so they may be reground to shape repeatedly at low cost. Wooden case is furnished for permanent chest for the tools.

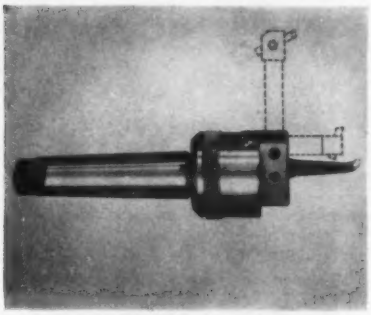
SPECIFICATIONS: Tooth arrangements are designed to give cutting efficiency to entire cutter head surface. Tooth pattern said to permit rapid stock removal with minimum splinter annoyance. For use in finishing either hardened or unhardened dies.

For additional information circle No. 97 on the Reader Service card.

BORING TOOL WITH ACCURACY TO .0002

E-Z Set Boring Tools

Maxwell Co., Bedford, Ohio



SPECIAL FEATURES: Increased tool rigidity because of larger dove-tail areas. Ground-fit male and female dove-tail. Micrometer-

Which job would you like to improve?

Listed below are some jobs discussed in Oakite's new 44-page illustrated booklet on Metal Cleaning. Let us help you do them with better results, greater economy.

OAKITE PRODUCTS, INC., 34G Thames St., New York 6, N. Y.

Tell me (without obligation on my part) about Oakite methods and materials for the following jobs:

- ☐ Tank cleaning
- ☐ Machine cleaning
- ☐ Electrocleaning
- ☐ Pickling
- ☐ Pre-paint treatment
- ☐ Paint stripping
- ☐ Steam-detergent cleaning
- ☐ Barrel cleaning
- ☐ Burnishing
- ☐ Rust prevention
- ☐ Send me a FREE copy of your booklet "Some good things to know about Metal Cleaning"

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COMPANY.....

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Technical Service Representatives in Principal Cities of U. S. & Canada

OAKITE SPECIALIZED INDUSTRIAL CLEANING MATERIALS • METHODS • SERVICE

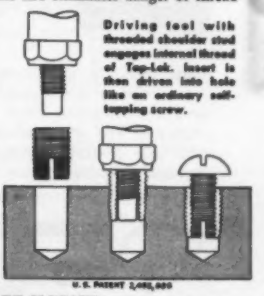
Circle No. 42 on Reader Service Card for more information.

TAP-LOK INSERT

Taps own thread—
Locks firmly in place

THE Tap-Lok Insert, of hardened steel, offers a durable threaded surface in aluminum, magnesium, die castings and other materials of relatively low shearing strength. It provides secure anchorage for screws, bolts and studs under stress loads in low strength materials and eliminates danger of thread stripping in assembling and service.

Special driving tool turns insert to tap its own thread with the edges of its slotted segments, which are forced inward slightly in tapping. Screw fastener passing into slotted area further increases locking effect of segmented insert in base material. Tap-Lok Inserts improve and safeguard your assemblies—help reduce scrap factor—reduce costs. Send for samples and literature.



Driving tool with threaded shoulder stud engages internal thread of Tap-Lok. Insert is then driven into hole like an ordinary self-tapping screw.

U. S. PATENT 2,485,600

ALSO MANUFACTURERS OF THE GROOV-PIN—
For positive locking press fit

GROOV-PIN CORPORATION
2017 Kerrigan Avenue
Union City, New Jersey

Circle No. 40 on Reader Service Card for more information

like adjustment which facilitates accuracy to 0.0002. Distorting slots or gibs have been eliminated.

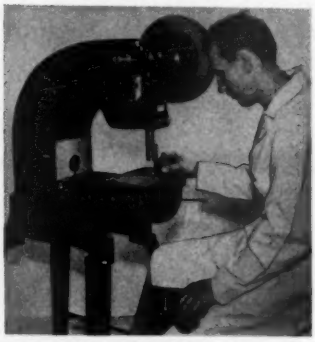
SPECIFICATIONS: Tools are chrome-nickel-molybdenum and nickel-molybdenum alloys. Modified square type threads reduce back lash and improve accuracy. Maximum boring bar capacities of ½, 1, and 1½ inches. Boring range from ⅜ to 20 inches. Interchangeable shanks. Boring bars and socket keys are standard equipment.

For additional information circle No. 98 on the Reader Service card.

4-IN-1 PUNCH PRESS

Four-Ton Punch Press

Kenco Mfg. Co., Los Angeles



SPECIAL FEATURES: An adjustable bed permits quick conversion of this punch press to long punch half or horn press. Can change from single to continuous ramming without stopping press.

SPECIFICATIONS: 12¾ inch throat. 400 lb. Patented trip mechanism. Clutch drive dog built into clutch collar rather than crankshaft slot to avoid weakening shaft by deep milling. Connecting rod bearings of steel-encircled bronze-lead alloy.

For additional information circle No. 99 on the Reader Service card.

BRIGHT DIP FOR BRASS, COPPER

Copper-Brite

Rossaul Co., New York City

SPECIAL FEATURES: Non-toxic, non-fuming bright dip for brass, copper and bronze. Removes oxides and fire scale.

SPECIFICATIONS: Three-second dip average required for removal of oxide and scale. Leaves metal passive and oxidation-resistant. Does not etch metal. Treatment followed by clear water rinse. Available in one, five and thirteen-gallon units.

For additional information circle No. 100 on the Reader Service card.

BRIGHT HEAT TREATING UNIT

Model T-100-E

Ipsen Industries, Inc., Rockford, Ill.

SPECIAL FEATURES: This unit is designed for bright heat treating, carburizing, carbonitriding and annealing. Could be used for heat treating small die casting dies. Unit is semi-automatic. Work is loaded manually and is transferred to quench without breaking atmosphere seal.

SPECIFICATIONS: Rating 100 pounds per hour. Maximum temperature 2100 F. Hearth is 12" wide x 18" long x 10" high. Electrically heated, with 8 bars for 16 KW input. Water jacketed cooling chamber with automatic temperature control. Quench tank has pneumatic-operated elevator and automatic temperature controlled heating and cooling coil. 2-speed oil propulsion.

For additional information circle No. 101 on the Reader Service card.

(Continued on Page 55)

BLACK MAGIC

The PROVEN Finish for Military and Civilian Items

Black Magic is a lustrous, permanent black for steel and iron. It meets military specifications for this type of black oxide finish. Not only an attractive finish but also a good bond for paints and lacquers. The ideal substitute for commercial plating, especially now with present plating material shortages. For fully automatic or hand operated tanks. Write for our complete catalog.

Items for civilian use with BLACK MAGIC finish.

MITCHELL-BRADFORD CHEMICAL COMPANY

MODERN METAL FINISHES

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BLACK-MAGIC OXIDE BLACKING SALTS
WITCH-DIP & WITCH-OIL FINAL FINISHES

SILCO Glass-Base PROTECTIVE COATING
HEAT TREATING SALTS, CLEANERS, ETC.

Circle No. 47 on Reader Service Card for more information

Advanced BARREL FINISHING

FREE

22 PAGES OF FACTS

This 22-page booklet is *guaranteed* to open your eyes! It gives you the inside story of advanced barrel finishing as *never told before!*

WRITE TODAY FOR YOUR *FREE* COPY

ALBEA Supersheen

AMERICA'S LARGEST MFR. OF ADVANCED BARREL FINISHING EQUIPMENT, MATERIALS & COMPOUNDS

ALBERT LEA, MINNESOTA

Circle No. 36 on Reader Service Card

MILWAUKEE AES MEETING ACCENTS DEFENSE PLATING

Addresses on the finishing of products manufactured for defense will highlight the annual meeting of the Milwaukee Branch of the American Electroplater's Society in April.

Speakers and topics scheduled include Dr. William Blum, National Bureau of Standards: "Specifications for Defense Plating and the General Situation as Regards to Civilian Plating"; Mr. Carol Hutchinson, Nubian Div., Glidden Co.: "Preparation of Metals for Organic Finishing—Specifications for Organic Finishing and Post Treatment of Metal Surfaces for Defense Applications"; and Myron Diggin, Hanson-Van Winkle-Munning Co.: "Plating to Meet Today's Conditions."

The meeting will begin at 2:00 p. m. on Saturday, April 28, with the banquet at 7:00 p. m. followed by a dance.

GETS MOBILIZATION POST

Arthur T. Dalton, secretary of Chicago Wheel & Mfg. Co., Chicago, has been appointed to the Advisory Committee, Abrasive Industry of the National Production Authority in Washington, D. C. During World War II he served for the duration on the abrasive advisory group of the War Production Board.

DU PONT MAKES GRANTS TO UNIVERSITIES

The award of 78 post-graduate and post-doctoral fellowships to 47 universities, and grants-in-aid to 10 universities, was announced recently by the E. I. duPont de Nemours and Co., Inc., Wilmington, Del. To finance these awards for the 1951-52 academic year, the company appropriated $390,000.

The pre-doctoral and post-doctoral fellowships provide support for students in the various branches of science. The grants-in-aid to universities are for unrestricted use in the field of fundamental chemical research.

SIMPLIFY PNEUMATIC DESIGN

with this unique electrically-operated AIR CYLINDER with HYDRAULIC CONTROL

Provides Absolute smoothness of piston movement — eliminates the natural "bounce" or "springiness" of air.

Permits Positive Control of Piston Speed in Either or both directions and at any point in piston travel.

WITH Bellows "Controlled-Air-Power" you can combine the speed, economy and flexibility of air-power, the smoothness of hydraulic operation, and inter-locked electrical control, all in a compact, space saving, easily installed assembly.

The Bellows Model BEM Air Motor (a double acting air cylinder) is a complete power unit in itself. Valve, electric valve operating controls, and speed controls are all built-in. The low-voltage built-in solenoid controls operate all day at high speed without hum, pounding, or excessive heat.

When used in the same assembly with the new Bellows Hydro-Check (an adjustable Hydraulic Resistance Unit) you obtain precision control and precision operation of pneumatic systems, easily adjusted to fit any operating requirement.

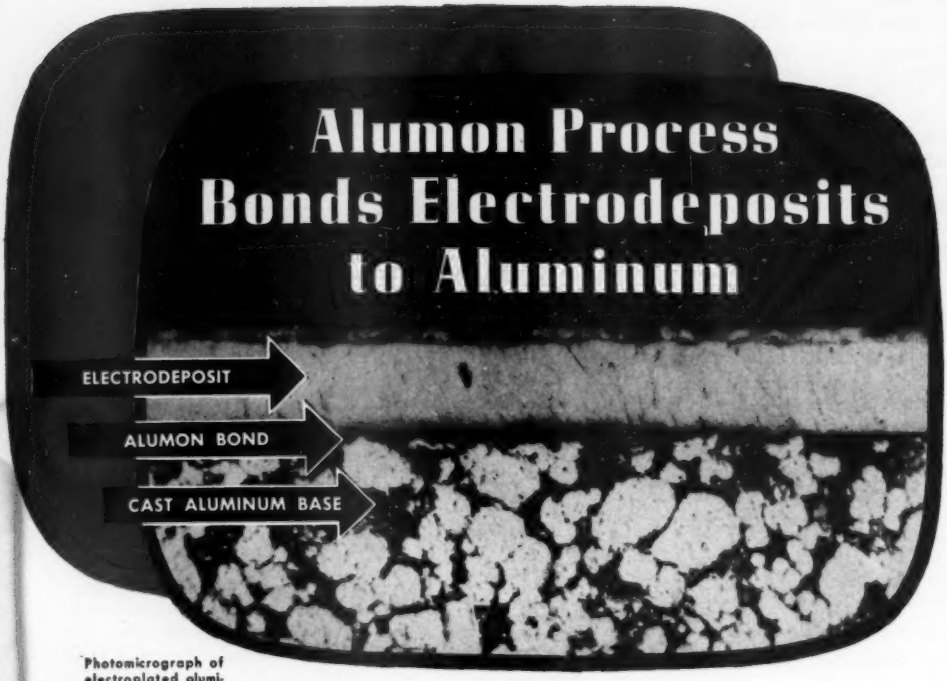
As a design engineer you'll be interested in knowing more about the Bellows system of pneumatic operation and controls. We'd like to send you two new bulletins showing how "Controlled-Air-Power" operates. No cost. No obligation. Just drop us a note and ask for your copies of Bulletins AV-300 and CL-30. Address The Bellows Co., Dept. DC 351, Akron 9, Ohio.

1200

The Bellows Co.
Akron 9, Ohio
FIELD ENGINEER OFFICES IN ALL PRINCIPAL CITIES

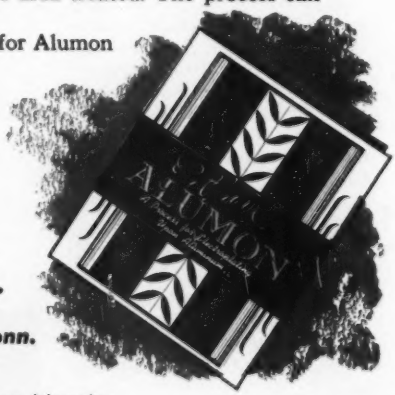
Circle No. 37 on Reader Service Card for more information

Alumon Process Bonds Electrodeposits to Aluminum



Photomicrograph of electroplated aluminum showing high tensile Alumon Bond.

Hundreds of manufacturers throughout the United States are now using electroplated aluminum. The Alumon process is simple. The work is merely cleaned, dipped in acid, dipped in Alumon and is then ready for electroplating with copper, nickel, and other metals. The process is suitable for plating most wrought and cast alloys . . . The cost of using alumon is low, being less than half a cent per square foot of surface area treated. The process can be fitted easily into regular plating cycles. Write today for Alumon Process bulletin and technical data on how you can use electroplated aluminum for your products.



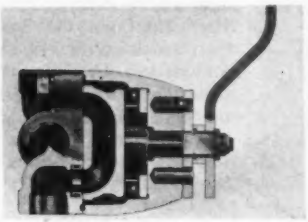
Enthone INC.

442 Elm Street, New Haven, Conn.

Circle No. 39 on Reader Service Card for more information

VALVE FOR HIGH PRESSURE LINES

"Shear-Seal" Design Valves
Barksdale Valves, Los Angeles



SPECIAL FEATURES: A pressure-balanced, self-aligning tubular valve seat is in intimate contact with an optically flat porting disc. The rotary movement of this disc opens and closes the flow passages. Fluid flow is through the hole in the seal, and not across the sealing surfaces. This system is used because it is easier to shear the fluid flow than to interrupt it in any other fashion. It also eliminates scoring of the sealing surfaces by dirt in the fluid. Closing force requirements for a one inch valve are nine pounds at 3000 psi, 15 pounds at 6000 psi.

SPECIFICATIONS: Shut-off valves from ¼ inch to 1½ inch for pressures to 6000 psi; 4-way selector valves from ¼ inch to 1½ inch for pressures to 6000 psi; 4-way dual pressure valves for 3000 psi or 6000 psi maximum pressure; manipulator valves from ⅜ inch to 1 inch for pressures to 1500 psi. Usable with all common industrial media such as water, air, hydraulic oil, gas, fuel and petroleum. Rotors are hardened corrosion-resistant steel. Bodies are high tensile strength hydraulic bronze. Housings are meehanite castings. Valves may be table, bracket or panel mounted.

For additional information circle No. 102 on the Reader Service card.

TWO-PHASE CLEANING BATHS

Addition Agent No. 230, Emulsion Cleaner No. 3
Northwest Chemical Co., Detroit

SPECIAL FEATURES: This is a system designed to replace hot chlorinated solvent degreasing. Process can be used automatically or manually, and if desired, parts can be kept on plating rack throughout the operation. Process is said to give the work a solvent spraying, with the part immersed in water rather than in air.

SPECIFICATIONS: The two-phase bath is built up of petroleum solvent treated with Addition Agent No. 230, or by adding 10 to 50 per cent Emulsion Cleaner No. 3 directly to water. Mechanical agitation is generally necessary to insure dispersion of the emulsion. Baths may be heated to a maximum of 160 F, depending upon the solvent used. In all cases the pre-cleaning must be followed by a spray rinse. The rinse, in conjunction with a displacement film formed by the cleaner, assures the removal of smut.

For additional information circle No. 103 on the Reader Service card.

ZINC PLATING BRIGHTENERS:

ARP No. 3, ARP No. 5
Allied Research Products, Inc., Baltimore

SPECIAL FEATURES: These brighteners are for use in plating on zinc. They are said to offer better throwing power, increased solution efficiency and uniform coverage. Also available is ARP No. 4, for use on cadmium.

SPECIFICATIONS: Adaptable to any type of electroplating equipment. Organic in nature. No. 3 operates in high current densities and produces a bright yellow nickel-type cast. No. 5 is used with low current densities and produces a plate with a blue chrome-type cast.

For additional information circle No. 104 on the Reader Service card.

ACCURACY TO .0001"
FOR TOOL ROOM AND PRODUCTION

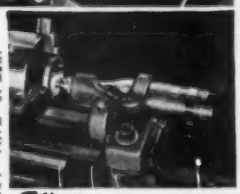
FOR LESS THAN $150

IN PRECISE MOUNTS ON LATHES AND OTHER MACHINE TOOLS, PRECISE GRINDER-MILLERS WITH 1/4 H.P. AND SPEEDS FROM 30,000 TO 45,000 R.P.M. DO THE WORK OF SINGLE-PURPOSE MACHINES COSTING 100 TIMES AS MUCH!

VERSATILITY. For cylindrical, internal, external and form grinding; for milling with H.S. steel or tungsten carbide midget mills; for micro-finishing and polishing. Use on wood, glass, rubber, plastics, or any metal including the hardest alloy steel.

DURABILITY. All metal housing, rigid PRECISE quill, lubricant-sealed, micro-precision bearings 1/4 H. P. AC-DC motor (115 volts) is protected by re-placeable fusetrons.

ATTACHABLE COOLFLEX SHAFT (optional). Quickly attached for bench work and handtool applications. Same speeds, same precision quill as in PRECISE GRINDER-MILLERS.

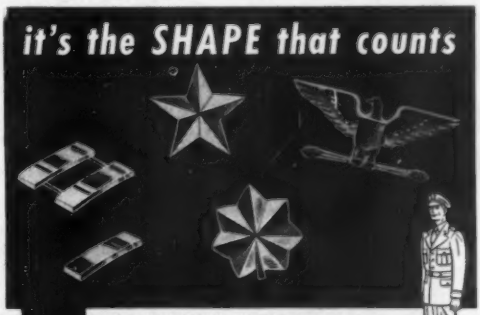


Write FOR CATALOG

PRECISE PRODUCTS CO., 1262 Clark St., Racine, Wis.

PRECISE GRINDER-MILLERS

it's the SHAPE that counts



... in BURNISHING MATERIALS too.

Military insignia, brass buttons and cap ornaments often acquire their bright, smooth finish from ABBOTT Burnishing Materials. They're shaped to do the job right.

Abbott Burnishing Shapes — Ball, Ovalball, Cone, Diagonal, Pin — are scientifically designed to make effective contact on metal stampings and castings of any size or shape. Each is made from high quality, Abbott bearing ball steel, deep hardened and polished to a mirrorlike, glass hard finish. For quality burnishing . . . use Abbott.

WRITE for your copy of the informative Abbott Catalog-Manual.

THE ABBOTT BALL COMPANY
1084 New Britain Ave.
Hartford 10, Conn., U.S.A.

ABBOTT

Circle No. 44 on Reader Service Card

Circle No. 34 on Reader Service Card

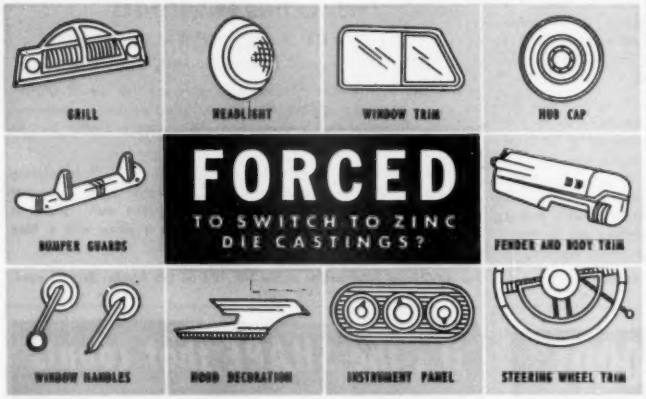
3M CONTINUES TO SUPPLY COATED ABRASIVE DESPITE EXPLOSION

Large established inventories of coated abrasive created as a result of a brisk business period will enable Minnesota Mining and Manufacturing Company to meet its customer's needs with little difficulty despite an explosion in part of the plant February 8.

This was announced by the 3M Company in a letter to its customers shortly after the explosion damaged the firm's mineral plant in St. Paul, Minn. The blast left the coated abrasives making and converting plants intact.

In the letter, the 3M Company expressed gratitude for "the many phone calls, telegrams and messages of sympathy and concern over the tragedy" and explained that "naturally our first concern has been with our casualties and their families."

Eleven persons died as a result of the explosion and 49 were injured.



Protect them with M & W Clear Coatings that stand 800 HOURS OF SALT SPRAY!

Zinc die castings and zinc plated steel are being used more and more as big manufacturers swing to these parts to replace unavailable materials. BUT the copper, nickel and chromium normally used for plating are in tight supply *too.*

Here's an effective way to meet this new problem. *Coat the die castings and zinc plated steel parts—instead of plating them!* Coat them with the M & W finishes that stand up under salt spray and weatherometer tests for the extraordinary period of 800 hours . . . that protect the zinc against discoloration!

Use DULAC Clear Universal Lacquer #462 if you want an air-drying lacquer—CODUR Clear Synthetic Y743 for baking. They both give the same exceptional performance. Write for free Technical Data Bulletin #110, or let our M & W technical consultants discuss your requirements with you.

PIONEERS IN PROTECTION

75th ANNIVERSARY M&W CO. 1876

MAAS & WALDSTEIN COMPANY

NEWARK 4, N. J. CHICAGO 12, ILL. LOS ANGELES 34, CAL.

PACIFIC COAST DIVISION: SMITH-DAVIS CO., 10751 VENICE BOULEVARD, LOS ANGELES 34, CAL.

MANUFACTURERS OF INDUSTRIAL FINISHES

Circle No. 48 on Reader Service Card for more information.

ANDREL PRODUCTS ELECTS NEW PRODUCTION MANAGER

The appointment of Marvin Friedman as production manager and secretary of the Andrel Products Corp., 55 South 11th St., Brooklyn, N. Y., has been announced by Wyn Savage, president. The company operates as a tool, die and jig plant, now concerned with the production of radar and electronic equipment.

NAMED WEST COAST REP.

Richard T. "Dick" Barnes has been appointed West Coast representative by Tumb-L-Matic, Inc., Bronx, N. Y., manufacturers of tumbling machines and processes. Mr. Barnes will operate out of San Francisco, with a mail address of P. O. Box 227 and telephone Sutter 1-4425. Mr. Barnes was graduated from M.I.T. in 1930 and has previously been associated with the Plastics Division of Monsanto Chemical Company and The International Nickel Company.

OFFER PLATING SCHOLARSHIPS

Two scholarships at the Joseph B. Kushner Electroplating School of Stroudsburg, Pa., have been offered by the Fulton Asphalt Company of 165 W. Wacker Drive, Chicago.

These scholarships include a complete one year home study course in "Electroplating Know-How". Details of the contest which closes midnight May 20, 1951, can be obtained by addressing an inquiry to Electroplating Scholarship Contest, Box 230, Stroudsburg, Pa.

STEWART-WARNER EXPANDS BOARD

Expansion of the board of the Stewart-Warner Corp., Chicago, from seven to eight members, and the election of Henry T. Heald to fill the newly created seat, were announced recently by James S. Knowlson, board chairman and president of the company. Mr. Heald has been president of the Illinois Institute of Technology since 1940.

ALUMINUM CLEANING

(Continued from Page 44)

tion of a phosphate film occurs with these more acid materials.

The less acid ones produce lesser degrees of etching but tend to form films of mixed phosphates. These films are microscopically rough and porous, thus providing a surface to which the organic finishes can key themselves, and in addition they provide varying degrees of corrosion resistance, should the organic finish be penetrated. They inhibit spread of corrosion back under the organic finish from the point of penetration.

Knowing how this type of acid cleaner performs, one realizes why it is not advisable to try to remove oils and greases and to etch or phosphatize in the same operation. The degree of contamination is never uniform and those lightly contaminated areas are freed of soil first, while the more soiled areas will require more time. Thus, the areas requiring little cleaning will be well or completely phosphatized, those requiring much cleaning may not be etched or phosphatized at all.

The subject of cleaning, whether for metals, textiles, dishes or hands, can never be discussed without giving great consideration to rinsing. The rinsing operations are just as important as those in which alkali or acids are used.

When an alkaline cleaner has emulsified the oil or grease on a die casting, for example, the soil becomes dispersed and is suspended as minute globules throughout the solution. When the work is withdrawn from the cleaning solution, a film of the solution adheres to the piece and must be removed with water causing a continual dilution of the film until the film consists only of water.

The stability of the emulsion of soil in the cleaner solution plays a major part in the success of the rinsing operation. Emulsions tend to break, i.e. the oil separates as a layer on the

(Continued on Page 67)

ZINC-ALLOY CAMERA CASES are ground satin-smooth with 3M Abrasives at Clarus Camera Co., Minneapolis, Minn.

How the right abrasive boosted belt life 600%

Loading caused by soft metals was limiting production to 40 units per belt at Clarus Camera Co. until the 3M representative recommended the *right* abrasive for the job. Now production has jumped to 240 units per belt!

Are *you* getting maximum production from *your* present abrasives? A 3M representative will be glad to show you how to cut your finishing time, get a smoother surface at a lower cost.

As an additional service, free analysis of your grinding problem is offered at any one of our 13 demonstration rooms—each located in a major industrial area. A 3M Methods Engineer will be glad to help you. Use coupon below.

Minnesota Mining & Mfg. Co. Dept. DC351
St. Paul 6, Minn.

☐ Please have a 3M Methods Engineer call.
☐ Please send copy of new "Step Up Production" booklet explaining the 3M Method of Grinding and Finishing.

3M ABRASIVE BELTS

Name.....

Firm.....

Address.....

City.....Zone...State.....

Made in U.S.A. by MINNESOTA MINING & MFG. CO., St. Paul 6, Minn., also makers of "Scotch" Brand Pressure-sensitive Tapes, "Scotch" Sound Recording Tape, "Underseal" Rubberised Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-Slip Surfacing, "3M" Adhesives. General Export: Durex Abrasives Corp., New Rochelle, N. Y. In Canada: Canadian Durex Abrasives Ltd., Brantford, Ontario.

Circle No. 41 on Reader Service Card for more information.

CURRENT REVIEWS

All Phases of Die Casting Process Covered in New Text

DIE CASTING
H. H. DOEHLER
McGraw-Hill, 330 W. 42nd St., New York, 502 Pages, $8.00.

This book is the first published definitive work on the die casting process. As such, it covers the field from the history of die casting to the present day die casting practices. The reader will find information as yet unpublished on die casting machines and the manufacturing process, from alloy control to final inspection and finishing.

The first chapter is devoted to an analysis of early and modern die casting machines. Two other chapters deal with the selection and handling of die steels, and shop practice in the construction of dies.

Included in the book also are chapters on die casting design, cost estimation and the cost of die casting as compared to other mass production methods. A separate chapter is devoted to the various die casting alloys, giving the advantages and disadvantages of each.

Other chapters deal with the machining, finishing and inspection of die castings. The section on finishing is devoted in large measure to finishing from the die caster's point of view, i.e., how to produce a die casting that will accept the desired finish.

The various organic, electroplated and mechanical finishes are described, and information is given on the surface qualities required by each finish. A final chapter is concerned with safety precautions in the die casting plant.

The book should prove useful as a textbook, and also as a reference for designers and all others concerned with the die casting industry.

Book reviews, abstracts of current articles and descriptions of products and processes of special interest to the designers, purchasers and finishers of die castings are included in this department.

How to get Finer Finishes at Lower Costs

with GLOBE Direct Motor Drive TILTING TUMBLING BARRELS

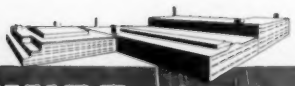
Available in Kiln-Dried Maple or Steel Shells

Process thousands of pieces at one time—faster, better and at lower cost—with Globe Precision Tumbling Barrels, dependable for 47 years. Globe's exclusive six-way work shifting motion cuts tumbling time and increases action. Speeds as low as 30 revolutions per minute assure finer finishes of non-ferrous metal parts. Motor is compactly mounted above the gear segment for space economy.

Free Experimental Service

Hupp's Experimental Engineering Laboratory can show you how to cut finishing costs. Just send samples of the parts to be processed along with a finished part. Write today! There's no charge or obligation.

Hupp Manufactures a Complete Line of Tumbling Barrels and De-Burring Machines.



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GLOBE STAMPING DIVISION
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Circle No. 29 on Reader Service Card for more information

INDUSTRY NEWS

STINE AND STOUFFER ELECTED DIRECTORS OF PANGBORN CORP.

Victor F. Stine and Lloyd L. Stouffer have been elected directors of the Pangborn Corp., Hagerstown, Md. Also, Mr. Stine assumed the duties of vice-president in charge of sales and engineering and Mr. Stouffer became secretary and treasurer and took charge of production. Executive vice-president P. J. Potter has retired from his more active duties, but will continue in a consulting capacity with Pangborn as a director and vice-president.

F. V. Stine

Mr. Stine, who joined Pangborn in 1913, as a clerk, progressed through various activities and in 1935 became vice-president in charge of sales. His new responsibilities also include the direction of the company's engineering activities. Mr. Stouffer, who has been with the company 32 years, has served as secretary and assistant treasurer since 1940, in charge of accounting and procurement.

TO HEAD LESTER ENGINEERING

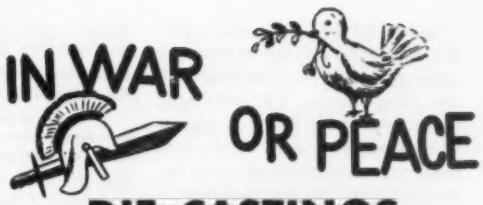
Lester Engineering Co., Cleveland, has announced that David White has assumed the office of president of the company. Mr. White was in dental practice prior to joining the company in 1940. In his former capacity as vice-president, he coordinated the executive activities of the company.

David White

David Sloane, formerly assistant to Mr. Lester, has been raised to vice-president in charge of engineering development. William Schwartz will continue in his capacity as chief engineer of the company.

BELLOWS OPENS WEST COAST OFFICE

The Bellows Co., Akron, Ohio, has announced the opening of a regional office at 733 East Pico Blvd., Los Angeles. This office, under the direc-



DIE CASTINGS
Like These
Will Save Time and Dollars

Wire and textile spools, as illustrated above, are just as necessary in troubled war times as in times of peace. Those shown here are cast in single units by Litemetal of magnesium and aluminum alloys.

Whether or not your needs are for winding wire, tire cord or textile filaments for civilian or military uses, Litemetal's extensive spool experience is yours for the asking. These die cast spools of lightweight alloys save time, material and much of the labor formerly required for machining and finishing.

LITEMETAL DICAST, INC. is an organization of specialists—men thoroughly experienced in the casting and machining of magnesium and aluminum alloys—the new metals of structural design.

Write today for literature and design information.

Quick action on inquiries.

LITEMETAL DICAST Inc.
A DIVISION OF HAYES INDUSTRIES
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PLANT AND EXECUTIVE OFFICES

tion of George Cook, will direct the activities of the company's sales and service engineers on the West Coast. The company, according to H. B. Link, executive vice-president, will also take over distribution sales activities for the Smith-Johnson Corp., Los Angeles, manufacturers of Senacon pneumatic equipment.

The Bellows Co. manufactures a line of industrial pneumatic equipment, including cylinders, motors and tool-feeding, workholding and clamping units.

AVAILABILITY . . .

(Continued from Page 21)

gel-like surface on the die casting, to seal off the surface of the base metal. In most cases, these coatings also improve adherence of any subsequent organic finish.

ANODIC COATINGS.

Thin oxide coatings to provide an inert, corrosion-resistant surface on aluminum die castings (and sometimes on zinc die castings) can be obtained by electrolytic processing. While the high silicon aluminum alloys are difficult to anodize for decorative purposes, it is entirely practical to produce an effective protective coating by this method.

ORGANIC COATINGS.

Organic coatings, for appearance or extra surface protection, can readily be applied to die cast products. Where conditions of exposure are extreme, some of the preceding chemical or electrolytic preparatory treatments will be used to improve paint bond and render the surface inert. Flat, gloss, wrinkle or textured paints are suitable for use on die castings.

UNIVERSAL

Die Castings

Preferred WHEN ONLY THE BEST IS GOOD ENOUGH

There must be a reason why so many highly discriminating manufacturers entrust *all* of their work to us. The reason is they *know* from experience that the finished job will meet every specification as to appearance, strength, accuracy and function. Furthermore, the price on either long or short runs is in line with their production and selling costs.

If you are located west of the Mississippi River we are in an excellent position to take care of your die casting requirements. Quotations made promptly.

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RY. SIGNAL

(Continued from Page 33)

anism. The two larger holes through the center section hold the mounting tubes by means of which the relay is slid into position on the mounting board. These two holes are cored with countersink, each with a groove into which the mounting tube is crimped to lock it in position.

In railway signaling, many variations of relays are made to operate circuits in accordance with different physical layouts (in order to meet the required conditions). Thus, variations in the individual mechanisms are occasionally necessary. To allow for such variations, the die cast base is provided with two knockout holes on one side. If the particular type of apparatus requires these additional openings, the thin web of material is punched out. When the extra holes are not needed for mounting purposes, this portion of the surface is left intact.

The previously mentioned pair of bosses on the underside (which are drilled and tapped) serve for attachment of the registration plate, the holes of which match pins in the plugboard to prevent plugging in the wrong relay.

OPPORTUNITIES

AIR FLASKS AVAILABLE

5000 lb. test; 17" diameter, 63" long; 6 cu. ft. internal capacity. For further information write:

THE BURDETT OXYGEN CO.
3300 Lakeside Avenue
Cleveland 14, Ohio
Attn: J. F. Wagner

DIE CASTING MACHINE WANTED

Wanted — Aluminum cold shot die casting machine. Prefer die space between bars 18" x 18". Will consider other sizes. Write Box 3151, Die Castings Magazine.

FIRM HAS NEW PLANT

Detroit Chemical Specialties, Inc., will move into its new plant some time early in 1951, according to Charles H. McAleer, president. The new plant, located at 101 South Waterman

Street, Detroit, has been remodeled by the company and has approximately 26,000 square feet of floor space. The company manufactures a line of platers' supplies and equipment, and polishing and buffing compounds and waxes.

NORMAN F. SMITH ELECTED PRESIDENT OSBORN

Norman F. Smith, who has been vice-president and general manager of the Osborn Mfg. Co., Cleveland, was elected president of the company by the board of directors at its recent annual meeting. Franklin G. Smith, founder and president of the concern since 1892, was elected chairman of the board.

CRUCIBLE STEEL APPOINTS TWO TO SALES POSTS

W. H. Wiewel, vice-president in charge of sales of the Crucible Steel Company of America, recently announced the appointments of R. K. Warren to the position of assistant manager of tool steel sales, and of R. C. Kuhn to assistant district manager of the Cleveland sales office. Mr. Warren has been with the company since 1929. Mr. Kuhn joined Crucible in 1943.

APPOINTED BY ROSS VALVE

Domenic A. DiTirro has been named to head the sales and technical service engineering divisions of the Ross Operating Valve Co., Detroit, according to an announcement by the company president, John Sainsbury.

U. S. Armed Forces in Arctic and Antarctic regions make extensive use of aluminum because aluminum becomes stronger in sub-zero weather than it is at room temperature.

FROM ONE COMPLETE SOURCE...

ZINC DIE CASTINGS

Quality guaranteed "on grade" zinc die castings produced by Glenvale under "The Certified Alloy Plan" assures you of obtaining uniform dependable castings at maximum economy.

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INTERCHANGEABLE PARTS

(Continued from Page 27)

parts also results in smoother and more pleasing contours.

Another advantage growing out of the adoption of die castings has been interchangeability of several parts. With 15 different variations in the line of stereoscopic microscopes, interchangeable die cast parts have provided greater economy by permitting the spreading of tool costs over a larger number of parts. Interchangeability also simplifies production line tooling and assembly problems.

Thus, by using die cast components, a smoothly contoured modern design has been made possible, as well as an improved mechanism. Machining time has been sharply reduced and a smooth surface for better finish has been obtained.

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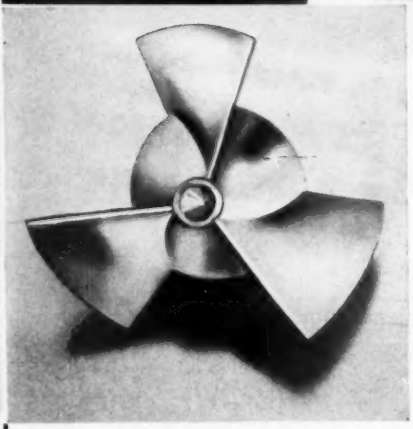
DIE CASTINGS

by FEDERAL



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LICENSED PRODUCER

—for example: This Instrument Vane, planned for mass production in a Multiple Cavity Die replaces one made by a different and slower method. Blades are now only 1/3 of original thickness, efficiency has been greatly increased and cost is lower. Note cone shaped hub and "spiral pitch" blades. The results attained in die casting this aluminum vane could not be realized at equal cost by any other means.

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LITERATURE AND SERVICES

(Continued from Page 12)

No. 42. ALL PHASES OF METAL CLEANING are covered in a 44-page booklet offered by Oakite Products, Inc. The booklet is called, "Some Good Things to Know About Metal Cleaning."

No. 43. DETAILS OF THE HYDROHONE PROCESS, a wet abrasive blast cleaning and polishing system usable on die casting dies, are available from the Pangborn Corp.

No. 44. GRINDER-MILLERS manufactured by Precise Products Co. can be attached to lathes and other machine tools. They are used for grinding, milling, micro-finishing and polishing.

No. 45. A HIGH SPEED TAPPING HEAD in which tap driving pressure is automatically regulated is described in literature offered by the Procunier Safety Chuck Co. Operators can detect dull taps by an increase in driving pressure needed.

No. 46. A CHROMIUM-LIKE APPEARANCE and a corrosion-resistant surface as a base for organic coatings can be produced by the Unichrome dip process described in a leaflet issued by United Chromium, Inc.

No. 47. "BLACK MAGIC," A BLACK OXIDE FINISH which can be hand applied or used with fully automatic equipment, is described in a catalog offered by the Mitchell-Bradford Chemical Co. This finish meets military specifications.

No. 48. CLEAR FINISHES FOR ZINC DIE CASTINGS are described in Technical Data Bulletin No. 110, available from the Maas & Waldstein Co. These finishes can be baked or air dryed and have shown good durability in tests.

No. 49. FURNACES FOR MELTING ZINC AND ALUMINUM are described in literature offered by the Stroman Furnace & Engineering Co. These furnaces are built in both dip-out and tilt models in capacity ranges from 200 to 14,000 pounds.

No. 50. LITERATURE AND DESIGN INFORMATION on aluminum and magnesium die castings are available from Litemetal Diecast, Inc.

HOW AN ORGANIC COATING

(Continued from Page 38)

taining a small amount of aluminum and pigment.

For perspiration resistance, a clear baking lacquer is sprayed over the enamel. The result of this change has been a maintenance of production schedules and a virtual elimination of rejects due to finish. Much of the problem grew from a finish specification not adapted to the specific parts and difficult to apply, therefore.

Elsewhere in the extensive line of radios and television sets manufactured by Philco, zinc die castings are being brass plated with outstanding success. Several of these brass plated die castings are displayed in Figure 5.

Both bright and satin finish are specified. For example, the television remote control tuner is housed in a pair of zinc die castings which are given a substantial brass plate. This unit lends itself well to the polishing and buffing cycle, and color matching is no problem. Finger grips around the edge tend to break up the solid, unbroken areas and add interest, without unduly complicating the finishing problem. Care must be exercised in polishing to avoid dragging the edges of the lettering on the face of the die casting, or to break the sharp, well-defined edge of the central panel. After plating, the letters are wiped with a dark paint to set them off.

The other die castings in Figure 5 are a pair of brass plated parts that form the escutcheon and door pull used on a console cabinet. The pull has a series of vertical flutes that offer an interesting, modern appearance, which are not difficult to polish and which take the brass plating very well. These pieces are given a satin finish.

ATLAS APPOINTS TWO

George L. Wirtz, president of the Atlas Mineral Products Co., Mertztown, Pa., has announced two appointments. Donald F. Deakin has joined the organization as water and sewer products director, and Newton O. Duncan, Jr. has been assigned to the Houston office.

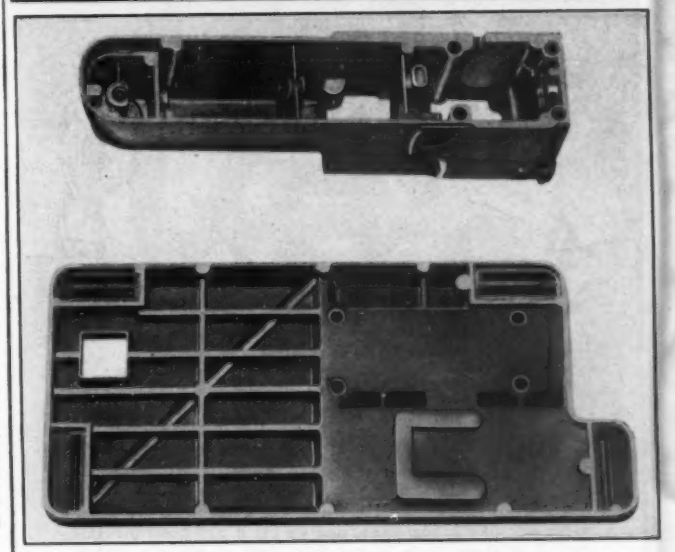
E. H. SCHMITT ELECTED

H. J. Taylor, president, Club Aluminum Products Co., has announced the election of E. H. Schmitt as secretary of the company. He succeeds the late C. W. Hallengren.

ASARCO NAMES DIRECTOR

Oscar C. Straus, treasurer of the American Smelting and Refining Co., has been elected a director of the company, it was announced recently following a meeting of the board. Mr. Straus began work as a teller in the First National Bank, Kansas City, Mo., in 1936. He joined American Smelting and Refining Co. in 1940, was made assistant treasurer in 1946, and treasurer of the company in 1949.

MORE ACCURATE DIE CASTINGS—
SEWING MACHINE PARTS



Top die casting is the Lower Arm; bottom casting is the Base

An excellent example of the elimination of a high amount of machining. Bushings are cast in locations specified by customer. Both of these good sized castings are aluminum alloy. Both avoided a lot of "headaches" in final assembly.

INQUIRIES INVITED

ACCURATE DIE CASTING COMPANY

3089 E. 80TH ST. CLEVELAND 4, OHIO

EASY FINISHING

(Continued from Page 25)

across "windows" in the component, as in Figure 5. In all cases the cause is the same, that the supporting periphery of the flash is so disposed as to give considerable mechanical strength even to thin sheets.

Because of this, it is frequently preferable to gang-trim small castings before tumbling, using dies with an 0.002 to 0.004 clearance, rather than rely on tumbling for total flash removal. Where this has been done it has on several occasions been possible to replace a 2½ hour tumble (giving indifferent results) by a twenty- to forty-minute treatment which effectively removed flash from all the remainder of the casting and satisfactorily burnished the surface.

•

FRAGILE PARTS of lightweight, large-area die castings sometimes break off in tumbling, owing to other projecting parts locking into them. This was the case, for example, in a model truck-cabin, Figure 7. In this the thin web between the two front windows was frequently broken, and investigation showed this to be due to the projecting ends of the bumper hooking around the thin sections.

One way of preventing this would have been to leave a heavy flash across the recess, Figure 8, until after tumbling, but this was not thought to be the best method in this instance —though it has had to be adopted on other occasions—and instead the weak section was stiffened by adding a thin interior rib as shown on the left.

When castings are to be tumbled it is desirable to study their outlines with a critical eye

Figure 7

and, so far as possible, either modify the form to eliminate "hook" portions or alternatively strengthen any fragile webs or slender projections that appear likely to sustain damage.

Flash can be prevented from forming across windows by appropriate die construction with very little difficulty, and die casters will always do so if the drawing is annotated as in Figure 8.

•

FLASH REMOVAL is, as will be allowed, the most critical of pre-polishing operations, for careless or inadequate trimming leaves score-marks on the casting that are not easily re-

PLEASANT MEMORIES

We Like to Look Back 25 and 30 Years

Most men like to reminisce; and we get a particular pleasure out of thinking back to our first years in the die casting business. For it was then that many of our present customers placed their first orders with us. The memory is made even more pleasant by the fact that these business relations have grown year by year and, in many cases, have developed into warm personal friendships.

We look upon this as proof of customer confidence in Badger service and quality. May we suggest that you, too, can benefit from our experience and modern facilities.

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moved by buffing. Trimming is a simple operation when the component has a bold outline and few internal openings, but is often both troublesome and costly if the casting is of an elaborate decorative nature with many small openings of irregular shape. The die cast insignia of manufacturing companies offer many examples.

Trimming can be avoided if the flash is brought off at right angles to the main plane of the casting, provided that the latter has a flat rear face. This, however, entails having a positive form exactly the same shape as the cavity projecting from the opposite die member.

To produce such a form by conventional methods, preserving exact registration between it and the cavity, is difficult and expensive, and is heartily disliked by die makers. It is nevertheless such a very great

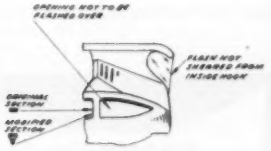

Figure 8

aid to easy flash removal that a brief note on a simple way of producing the positive form may perhaps be useful.

After the cavity has been sunk in one die member, and the two parts of the tool are dowelled in correct register, the blocks are separated again. The cavity is now greased and filled up flush to the die face with lead, or quick-hardening plaster, this being trimmed off absolutely level.

An adhesive is applied to the face of the lead casting and the two halves of the die are placed together again. When the adhesive has set the cavity member is carefully pried off, leaving the lead attached to the face of the opposite block. The face of this block is now heavily sand-blasted, after which the lead can be removed. The imprint of the required form is now found sharply outlined on the block, and can be traced around with a milling machine. Subsequent-

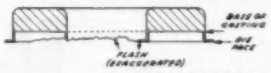

Figure 9

ly the remaining area of the die block is brought down to the required level.

By this method both exactness of form and precision of registration are better assured than by the use of templates or other equivalent means. A casting produced from a die of this type has a flash line after the style of that shown in Figure 9. This can be cleared either on an abrasive wheel or on a flat-belt grinder.

•

SOME CASTINGS can only be finished effectively by tumbling, since their form is not well adapted to trimming. Such

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is the case, for example, with parts that are die cast already interlocked, like the lighting-fitting suspension chain illustrated in Figure 10.

Since a casting of this kind has to be produced from a four-slide die, it is often difficult to keep the flash thin and even, while in the example shown, with its internal angles, it was impossible to clear the flash

Figure 10

completely without long tumbling with small and heavy chips. As can be seen, the links are extensively filigreed, and had the incised decorative designs been cut only to the depth required they would have been wholly blurred and abraded by the tumbling operation.

This, however, was foreseen, and the engraving of the cavi-

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ties was made very much deeper and sharper than was actually required in the finished chain. As cast, the decoration appeared crude and unattractive, but after tumbling it possessed the softened contours and almost hand-worked finish that was desired. Where prolonged tumbling is likely to be needed it is always best to heighten the contrasts of the surface in this way, whether or not subsequent buffing and plating are projected.

ALCOA INCREASES ALUMINA CAPACITY

The Aluminum Company of America will soon begin construction of a new alumina plant near Bauxite, Ark., according to a recent company announcement. Designed to process low-grade bauxite ore, the new plant will increase by nearly 50 per cent the amount of alumina now being produced by the company. Alumina is the refined ore from which basic aluminum is obtained by the smelting process.

NAMED WASHINGTON CONSULTANT

W. I. Tebo has been appointed Washington engineering consultant and technical advisor by the Detrex Corp., Detroit, according to an announcement by

W. I. Tebo

A. O. Thalacker, vice-president and general manager of the company. Mr. Tebo will have his headquarters at the Shoreham Hotel, Washington, D. C.

LOS ANGELES FIRM REORGANIZED

The Machinery Manufacturing Co., former builders of the Vernon line of jig borers, millers, shapers and tool and cutter grinders, recently announced their reorganization under a new firm name. The new company is known as the Diversified Metal Products Co., Los Angeles. At present, the company is engaged in a development program on several new machine tools.

ALUMINUM CLEANING

(Continued from Page 57)

surface of the solution, when diluted to any great extent. Thus, an unstable emulsion will break when rinsed and will redeposit soil on the surface of the work. It is important, in the choice of a cleaner, to make sure it forms stable emulsions and is free-rinsing.

The control of water hardness affects rinsability. Unless the calcium and magnesium in

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water are controlled, they precipitate as soaps or carbonates, adhere to the processed work and are practically impossible to rinse from the work.

The solubility of the components of a cleaner can affect rinsability. In automatic equipment and in some manual operations, periods as long as 45 seconds are required to transfer work from the hot cleaner tank to the rinse tank. During that time the cleaner films dry. Reducing the temperature of the cleaner decreases the degree to which the precipitated solids are baked by the heat of the work, but the temperature cannot be reduced below that required for good cleaning, and this is frequently insufficiently low to prevent the drying of a film.

To rinse the films from the work requires first that the film dissolve and, unless all components of the film and, thus, of the cleaner, are not quickly and easily soluble, incomplete rinsing will occur. This difficulty can only be overcome by prolonged rinsing, difficult if not impossible to obtain in automatic equipment.

No matter how the rinsing is done, it must be done with *clean* water. The cleanliness of the metal surface being processed is dependent upon the cleanliness of the rinse water. If a soak operation is used, the water inlet should be in such a position, generally at the bottom of the tank, as to move the contamination from the tank quickly.

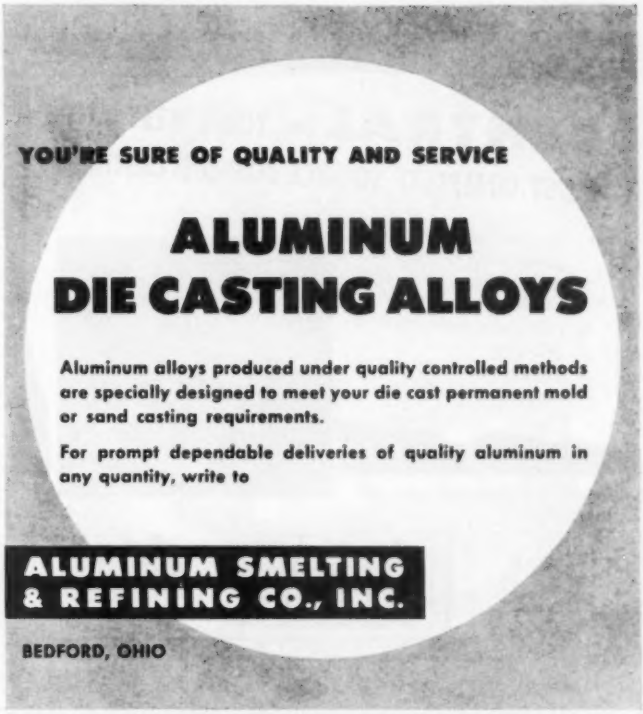
Sufficient water should be supplied to the tank to maintain a clean tank of water and the amount of water will be dependent upon the amount of work being processed, the amount of cleaner carried over by the work due to its intricacy of shape, and the film-forming tendencies of the solution preceding the rinse.

More and more common are spray rinses. Spray rinsing has several decided advantages over soak or immersion rinsing. The water not only removes cleaner film by dilution, but "blasts" the film and any solid matter like impacted buffing compound and

smut from the work by impingement of sprays. The rinse water is always clean (unless it is collected and pumped back through the sprays).

The shape of most die castings is such that polishing and buffing compounds tend to collect and be packed into the various recesses, intersections of surfaces, and the like. These impacted masses are extremely difficult to remove without intense agitation supplied by hand scrubbing, electrocleaning or spraying. Hand scrubbing is undesirable from a cost standpoint. Electrocleaning is not performed on aluminum alloys.

Spraying is the only economically feasible method of obtaining the desired agitation. Where operations are sufficiently large, spray washing is desirable, but in many operations only soak tank cleaning is employed. The installation of a good spray rinse following an alkaline soak tank will, in many cases, solve problems of adherent solid soil removal.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FORT has designed and built a new machine for casting automobile grilles and other items of comparable size—actual die space is 40" x 60" x 36" thick.
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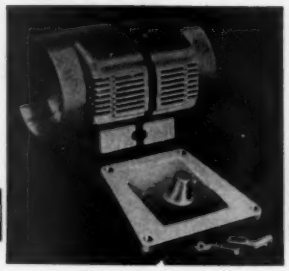

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The design of a spray rinse is very important. Water pressure of 15-30 pounds should be available. If work is supported properly, these pressures will not unrack it. The positive contact necessary for bright electroplating and for anodizing should eliminate unracking problems. Where some racks in use are the type upon which work is hung rather than clamped, a valve in the water supply line can be used to reduce the spray pressure for these particular racks.

The number of spray nozzles used should be sufficient to impinge upon every unit of significant surface. The size of each individual stream of water should be such that at the available water pressure it produces a force great enough to dislodge the impacted and previously softened soils.

Where operations are fairly continuous, a continuous flow of water through the spray is necessary. Where operations are intermittent, a foot treadle connected to a shut-off valve makes possible the operation of the sprays only when work is to be rinsed. Care in the design of a spray rinse will save many dollars in minimizing rejected work and in a saving of space resulting from a compact cleaning operation.

The solution of any cleaning problem requires answers to four questions:

1. What base metal is to be cleaned?

2. What equipment is available?

3. For what subsequent operations must the metal be prepared?

4. What degree of cleanliness is required?

In this case, the answer to the first question is simplified as we are considering aluminum alloys only. Nevertheless, we must know the alloy because copper-bearing alloys produce copper smuts and most aluminum die castings produce silicon smuts. We must allow for the removal of the smuts should they form.

The equipment available has an influence on our choice of

materials. In an operating production line, we must apply the material to fit the equipment—soak tank cleaners for soak tanks or spray wash cleaners for spray washing machines. If an old department is being redesigned or a new line is being designed, we can then consider equipment appropriate to the type and quantity of work being processed.

Naturally, subsequent operations are extremely important as pointed out earlier. Plating of die castings requires the ultimate in cleanliness—all soils including oxides must be removed. Anodizing does not require the removal of the naturally occurring oxide film.

If the parts are to be subsequently machined, superficial films of oil and grease may not be undesirable. Knowing what is to be done with cleaned work makes possible an estimate of the degree of cleanliness required and what type of cleaning operation must be installed.

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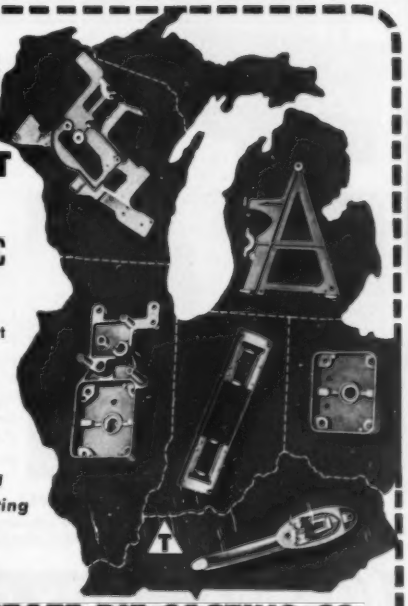

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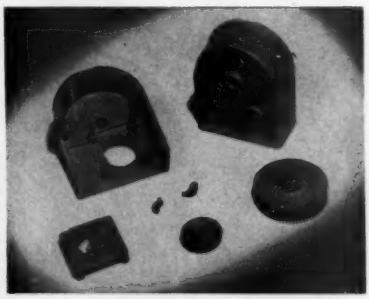

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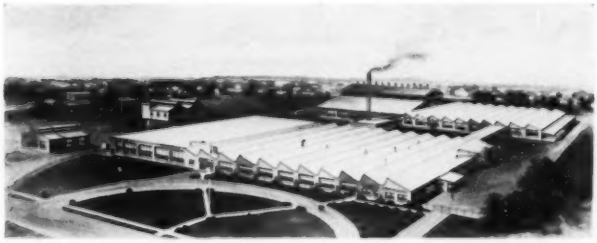
THIS is the fourth of a series introducing members of the HILFINGER organization. It is through the efforts of these individuals that our company has become one of the outstanding Producers and Finishers of Zinc Alloy Die Castings in the United States.

Shown at the right are key men in the business that makes and finishes the die castings that carry the name of HILFINGER.

INQUIRIES WILL RECEIVE PROMPT ATTENTION



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